NASA SP-7011(41)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7011(41)

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A CONTINUING BIBLIOGRAPHY

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A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during August 1967

Scientific and Technical Information Division
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. **SEPTEMBER 1967**

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In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. The contents of this issue are comprised of abstracts that were prepared by the three contributing organizations.

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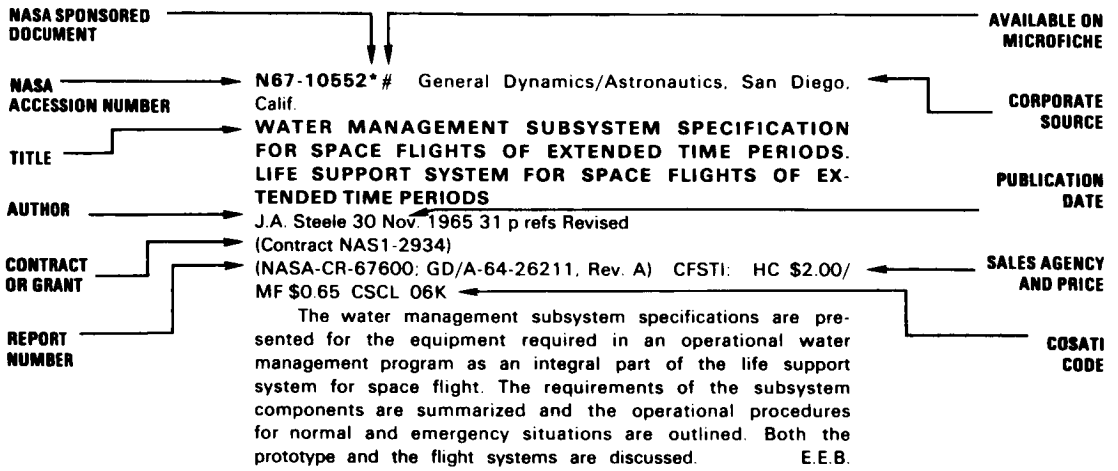
TYPICAL CITATION AND ABSTRACT



AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography SEPTEMBER 1967

STAR ENTRIES

N67-27816 Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

THE SIGNIFICANCE OF THE RADIATION DOSE RECEIVED FROM INHALED RADIO-ACTIVE MATTER BY AN AIRCREW ON A FLIGHT THROUGH A FALLOUT ENVIRONMENT [DE BETEKENIS VAN DE STRALINGSDOSIS TEN GEVOLGE VAN INHALATIE VAN RADIOACTIEF BESMETTE LUCHT VOOR VLIEGTUIG BEMANNINGEN]

A. J. Hoff Feb. 1967 15 p refs In DUTCH, ENGLISH summary
(MBL-1907-2; TDCK-47863) CFSTI: HC $3.00/MF $0.65

An aircrew on an operational mission through a fallout environment is exposed to ionizing radiation. The total dose can be divided into the direct dose originating from the gamma radiation of the radioactive particles and the indirect dose originating from inhaled radioactive matter. The ratio between the direct and the indirect dose is studied. Calculations show that the direct dose is larger than the indirect dose. The indirect dose is calculated for one special case on the basis of an estimation of the concentration of radioactivity in the cloud from a nuclear explosion and above a fallout region. Author

N67-27918# Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.

LOW ENERGY β COUNTS AT THE RADIOACTIVITY MEASUREMENT LABORATORY OF GRENOBLE [LES COMPTAGES β DE FAIBLES ENERGIES EFFECTUES AU L.M.R.]

Anne-Marie Duplaa, Michel Chevalier, and Henri de Choudens Nov. 1966 37 p In FRENCH
(CEA-R-3067) CFSTI: HC $3.00/MF $0.65

Radioelements emitting β low energy are very useful in biology especially in labelled compounds. The counting method with liquid scintillators is very often used. The Radioactivity Measurement Laboratory of Grenoble uses for these measures a tricarb Packard. The samples to be counted are: titrated water which is measured with a dioxane scintillator; animal textures which contain ^{14}C: these samples are dissolved in hyamine 10 X, then melted with a toluene scintillator; solid samples containing ^{14}C or ^{45}Ca (plant ashes): these samples are measured by suspension in scintillating mixtures. Gaseous samples of $^{14}CO_2$ are also counted. the gas is retained by hyamine, then mixed with a liquid scintillator. Counting of double labelled samples is also made on $^{45}Ca + ^{32}P$ and $^{14}C + ^{32}P$. The quenching corrections are made by internal standardization. Author (NSA)

N67-27931# Technische Univ., Berlin (West Germany). Institut fuer Flugfuehrung und Luftverkehr.

HUMAN ENGINEERING AS A SCIENTIFIC DISCIPLINE [DIE ANTHROPOTECHNIK ALS WISSENSCHAFTLICHE DISZIPLIN]

R. Bernotat [1966] 23 p In GERMAN; ENGLISH summary Presented at the Ann. Joint Meeting DGRR/WGLR, Bad Godesberg, W. Germany, Oct 1966
(DGRR/WGLR Paper-66-086) CFSTI: HC $3.00/MF $0.65

After a short review of the development a definition of human engineering is given and the classification into other special subjects is shown. The main aspects of human engineering with the task separation of man and machine, the environmental layout, the dynamic adaptation of the machine to the human, and the argument of a scale for the mental work load are described. The simulator is indicated as the central tool of the scientist working in this field. The report closes with an abstract about the present state of human engineering in Germany. Author (ESRO)

N67-27968# Human Engineering Labs., Aberdeen Proving Ground, Md.

SOME STUDIES OF TEMPORARY HEARING LOSSES RESULTING FROM REPEATED EXPOSURE TO GUNFIRE NOISE

David C. Hodge and R. Bruce McCommons *In* Army Dept. Proc. of the 1966 Army Sci. Conf., Vol. I 26 Aug. 1966 p 469-483 refs (See N67-27941 15-34)
(AD-634690)

Reliability of individual and group mean temporary threshold shifts (TTS) of humans subjected to gunfire noise were studied to determine the effect of varying the number of impulses and the peak sound level of the impulses. Two studies were conducted with subjects having normal hearing, and a third study with subjects having subnormal hearing. Another study was made to determine reliability of the TTS with frequencies of 8000 cps and above. Individual TTS were not found to be sufficiently reliable to permit generalization of impulse noise effects, probably due to (1) daily differences in susceptibility to noise exposure and (2) variations in auditory thresholds. The group means vary less and are, therefore, considered a more reliable measure of noise effects on hearing. M.W.R.

N67-27982# Army Tank-Automotive Center, Warren, Mich.

THEORY OF HUMAN VIBRATION RESPONSE

Fred Pradko, Richard Lee, and Victor Kaluza *In* Army Dept. Proc. of the 1966 Army Sci. Conf., Vol. II 26 Aug. 1966 p 215-228 refs (See N67-27971 15-34)
(AD-634632)

Transfer function techniques were utilized to obtain the whole body human response to mechanical vibrations. Each combination of output and input was correlated with vibration force and output acceleration by equating human behavior to a linear system. The

frequency spectrum was used to produce the transfer function from test data describing the input to man in terms of force, acceleration, frequency, and recorded output measurements taken at the subject's head. The upper boundary tolerance of human response was established by tests at various acceleration levels down to very low intensities. Correlation of analytical transfer function statements and experimental test data was established for random vibrations of 2 cps and 10 cps bandwidth filters. Indications showed that subjective response can be predicted by expanding the transfer function approach to include human response quantitatively and with time consideration; this new approach was called "absorbed power". G.G.

N67-27991# Army Medical Research and Nutrition Lab., Denver, Colo. Physiology Div.
HEMODYNAMIC ALTERATIONS IN HUMANS AND ANIMALS DURING CHRONIC HIGH ALTITUDE EXPOSURE
James A. Vogel, James E Hansen, and John P. Hannon *In* Army Dept. Proc. of the 1966 Army Sci. Conf., Vol. II 26 Aug. 1966 p 419–432 refs (See N67-27971 15-34)
(AD-634647)

Experiments were performed on human subjects and on dogs to determine if their cardiovascular and respiratory systems were able to maintain normal delivery of oxygen to body tissues at altitudes up to 14,000 ft. Heart rate, cardiac output, arterial blood pressure, stroke volume, and total peripheral resistance data were obtained of resting and exercising periods during two-week exposure to altitudes of 5,200 ft, 11,400 ft, and 14,000 ft. It was found that as arterial oxygen tension and saturation dropped with increase in altitude, arterial oxygen content dropped approximately 7% whereas venous content dropped only 5%, thus indicating reduced oxygen extraction from blood by the tissue. However, by a third week at 14,100 ft, tension and saturation had increased back to sea level values at rest. The increased total blood flow was an early body response to adapt to an environment of reduced oxygen tension; this cardiovascular response disappeared in direct relation to the increasing arterial oxygen content. G.G.

N67-28008*# Indiana Univ., Bloomington. Dept. of Anatomy and Physiology.
THE EFFECTS OF DEHYDRATION ON THE AEROBIC AND ANAEROBIC CAPACITIES OF MEN, PART IV Final Scientific Report
S. Robinson, B. Sadowski, and J. L. Newton 31 Dec. 1966 12 p refs
(Grant NsG-408)
(NASA-CR-84654) CFSTI: HC $3.00/MF $0.65 CSCL 06S

The effects of dehydration on V_{O_2} max, O_2 debt, blood lactate, and temperature regulation of 4 men in exhausting work and recovery were determined. In the dehydration experiments the men were dehydrated by 4.2 to 4.7% of body weight in the morning by working in the heat for 2 to 3 hours. They then rested for about 3 hours in a cool room without ingesting any fluid and their responses during an exhausting treadmill run and recovery were determined. Control experiments were carried out without the dehydration. The average times of running to exhaustion were 4.63 and 4.04 min in the control and dehydration experiments respectively. Body temperature, V_{O_2} max, O_2 debt and the elevation of blood lactate in the runs were not significantly different in the two experiments. The reduced capacity for running in dehydration was associated with an average increase of 5% in the O_2 requirement per kg of body weight per minute of running time. The small increase in energy requirement was dependent on more rapid accumulation of the O_2 debt during the runs. Depletion of carbohydrate reserves was probably not a contributing factor to the decreased work capacity. Author

N67-28010*# California Univ., San Diego.
BRAIN MECHANISMS IN CONDITIONING AND LEARNING
Robert B. Livingston Brookline, Mass. Neurosci. Res. Program [1966] 116 p refs In Neurosci. Res. Prog. Bull. v. 4, no. 3, 30 Dec. 1966 p 235–347
(Grants NsG-462; Nonr(G)-00034-66; NIH GM-10211-05)
(NASA-CR-84656) CFSTI: HC $3.00/MF $0.65 CSCL 05J

Studies of higher mammals and the corresponding brain mechanisms thought to be involved in conditioning and learning are reported. The first topic considered under general concepts relating to conditioning and learning is growth of concepts pertaining to brain mechanism involved in higher nervous processes. Next reinforcement is examined from the standpoint of motivation, response-release, attention, and orientation. Some parameters involved in learning are cited and information processing of sensory signals is explained. Electric current delivered to the brain for discovering brain organization is discussed. The limbic-hypothalamic-brainstem systems are examined in relation to motivation and learning. Studies to determine whether or not measurable structural changes occur in the nervous system during prolonged periods of learning are described, and additional comments relating to human learning are presented S.P.

N67-28013*# Miami Univ., Fla. Research and Teaching Center of Toxicology.
FLUORINE TOXICITY STUDIES Status Progress Report
M. L. Keplinger 1 Dec. 1966 14 p
(Grant NGR-10-007-012)
(NASA-CR-84659) CFSTI: HC $3.00/MF $0.65 CSCL 06T

Irritation in men from inhalations of fluorine were examined, and the results from single exposures are tabulated. Data indicated that irritation to the eye was the most sensitive index of a subjective effect. Another experiment was conducted to determine if damage to the kidneys would regress completely when animals were allowed to live longer than 45 days after exposure. Repeated intermittent exposures to fluorine appeared to cause less effects than a single exposure at the same concentration. Animals exposed to low concentrations of fluorine appeared to be less susceptible to effects caused by exposure to high concentrations of fluorine than animals not exposed previously. Formation of edema following exposure to fluorine was shown. Succinic dehydrogenase may be increased in the lung after inhalation of fluorine. Very young and old mice apparently are no more susceptible to fluorine than the young adult animal. S.P.

N67-28039# Royal Aircraft Establishment, Farnborough (England).
A NOTE ON THE MODEL MATCHING TECHNIQUE FOR THE MEASUREMENT OF HUMAN OPERATOR DESCRIBING FUNCTIONS
J. G. Jones Dec. 1965 24 p refs
(RAE-TR-65290) CFSTI: HC $3.00/MF $0.65

One method of measuring the describing function of a human operator in single axis closed loop control is to use an adaptive analogue model. This report discusses the application of this method with particular reference to the effects of human operator noise, or remnant, on the adapted state. Author

N67-28049# Institute for Defense Analyses, Arlington, Va.
ON THE THEORY OF COILING AND UNCOILING OF DNA MOLECULES
Elliott W. Montroll *In* Brookhaven Natl. Lab. Symp. on Inelastic Scattering of Neutrons by Condensed Systems Mar. 1966 p 57–68 refs (See N67-28041 15-24)

Various models of the process of simple thermal splitting and uncoiling of deoxyribonucleic acid (DNA) are briefly studied. A reasonable weight function for various sequences of the ladder bonding state is considered, in order to calculate the required statistical averages from the simplest random model. The most general one-component system model involving nearest-neighbor

correlations only is defined. The first form of the partition function for a mixed system is expressed, as is the melting curve for the two-component zipper model. R.LI.

N67-28091# Aerospace Medical Div. Arctic Aeromedical Lab., Fort Wainwright, Alaska.
HUMAN PERFORMANCE UNDER CONDITIONS OF COLD AND STRESS. REPORT ON UNIT EFFECTIVENESS
Richard G. Possenti Feb. 1967 17 p
(AAL-TR-66-11; AD-649513) CFSTI: HC $3.00/MF $0.65

At the request of the Surgeons Office, U.S. Army, Alaska, USARAL, the Arctic Aeromedical Laboratory psychologist accompanied 30 Army personnel on a field exercise near Eielson Air Force Base, Alaska, to study behavior and performance under conditions of cold and stress. The men were divided into squads of 10 men each, representing three companies. Personality and attitude scales were administered before, during and after the exercise. Analysis showed the essential character of dynamic leadership purpose and direction necessary for mission success. It also pointed up that the absence of these characteristics (variables) leads to independent and separate action with the consequent result of unit ineffectiveness. The most important factor in mission success seemed to be good leadership. TAB

N67-28095# Technology, Inc., San Antonio, Tex. Life Sciences Div.
CARDIOVASCULAR RESPONSES TO INCREASED G LOADING
David D. Michie and Clarence P. Cain Feb. 1967 98 p refs
(Contract AF 41(609)-2939)
(AD-648371) CFSTI: HC $3.00/MF $0.65

It is concluded that there is no single optimum back angle. Rather a back angle range of +10 degrees through -10 degrees appears to permit minimum distortion of cardiovascular function during a 90 second exposure to +G sub x forces ranging from 1 through 10 with the G sub z components varying from -0.75 through +2.7. In order to accurately evaluate the physiological effects produced by increased G loading, or the tolerance limits to these forces, it is imperative that the magnitude and direction of both the G sub x and G sub z vectors be known. Author (TAB)

N67-28192# Applied Science Associates, Inc., Valencia, Pa.
A COMPARISON OF THREE METHODS FOR PRESENTING PROCEDURAL TROUBLESHOOTING INFORMATION Final Report, Apr. 1965–Mar. 1966
Thomas K. Elliott Wright-Patterson AFB, Ohio, AMRL, Dec. 1966 47 p refs
(Contract AF 33(615)-1137)
(AMRL-TR-66-191; AD-649598) CFSTI: HC $3.00/MF $0.65

The effects of subject aptitude and performance aid mode of presentation on the performance of procedural, between-stage troubleshooting tasks on a real piece of electronic equipment were studied. The study used nondecision aids presented in three modes, namely, an automatic retrieval of visual information, an automatic retrieval of audio information, and a manual retrieval of visual information. Two aptitude groups (Air Force electronic index 40-60 and 75-95) with no previous electronic training or experience were given from 3 to 5 hours of task training before the experiment. Each subject solved 26 actual, and 11 synthetic problems. The study indicated no difference in effectiveness of aids using visual presentations. Both were superior to audio presentations. The two aptitude groups were equally effective in performing troubleshooting tasks using nondecision aids. In comparison with a previous study using decision aids, the study showed nondecision aids produced superior performance on the same between-stage troubleshooting problems using similar subjects. Author (TAB)

N67-28199# School of Aerospace Medicine, Brooks AFB, Tex.
PHARMACOLOGY IN SPACE MEDICINE [PROBLEMA FARMAKOLOGII V KOSMICHESKOY MEDITSINE]
V. E. Belay et al [1966] 20 p refs Transl. into ENGLISH from Russian Presented at the 17th Intern. Astronautical Congr., Madrid, 9–15 Oct. 1966
(SAM-TT-R-808-0167; TT-67-61272; AD-648489) CFSTI: HC $3.00/MF $0.65

The study of the specific effect of medications under laboratory experimental conditions (G loads, weightlessness, prolonged isolation, etc.) and possible emergency situations (change in environmental gases, radiation effects, upset in meal schedule, etc.) is a necessary stage in the preparation for long space missions. Two basic aspects of the general problems of space pharmacology are: (1) enhance body tolerance to extreme flight factors and (2) natural response to medications during the simulation of some space-flight stresses. Author (TAB)

N67-28206# Pittsburgh Univ., Pa. Pymatuning Lab. of Ecology.
RADIOECOLOGY OF SMALL VERTEBRATE SPECIES UNDER NATURAL ENVIRONMENTS Progress Report, 1 Dec. 1965–30 Nov. 1966
[1966] 31 p
(Contract AT(30-1)-2579)
(NYO-2579-14) CFSTI: HC $3.00/MF $0.65

The ecology of three small mammals, the pocket gopher (*Thomomys talpoides*), the Unita ground squirrel (*Citellus armatus*), and the chipmunk (*Tamias striatus*) was investigated. The purpose of this work was to find a test animal suitable for radiation experiments. Gophers of northeast Wyoming were trapped at various altitudes and census records of populations were kept. Ground squirrels were found at the same altitudinal transect, but it was not possible to obtain accurate population figures because the animals began to enter hibernation in August. The chipmunk occurs from the Atlantic seaboard to Minnesota and census studies were made by a number of investigators. At Pymatuning Laboratory studies on analysis of population numbers and biomass of this mammal are being conducted. Results of all of these studies are presented in the form of tables and graphs. The measurement of thyroid secretory activity of small mammals was undertaken as an indication of total metabolic activity in order to study relative effects of radiation exposure. Animals were injected intraperitoneally with iodine-131-labeled sodium iodide and returned to their natural environment. After 48 hours the animals were recaptured, whole body counted, and returned again. The thyroid was counted separately in vivo. The slopes of whole body counts and thyroid counts were similar, indicating that whole body elimination of iodine-131 was a function of thyroid secretion of the isotope. Iodine-131 retention curves for free-ranging pocket gophers and ground squirrels were examined. It was noted that the weights of adrenal glands were significantly different at different elevations. The adrenal weights and iodine-131 curves tended to substantiate each other and offered correlative evidence as to the relative stress demands on the pocket gopher and ground squirrel at different elevations. NSA

N67-28222*# Scientific Translation Service, La Canada, Calif.
VIABILITY OF MICROORGANISMS IN THE DESERT SOILS OF TURKMENIA [ZHIZNESPOSOBNOST'MIKROORGANIZMOV V PUSTYNNYKH POCHVAKH TURKMENII]
A. I. Zhukova and V. Kh. Kozlova Washington, NASA, Feb. 1967 8 p refs Transl. into ENGLISH from Mikrobiologiya (Moscow), v. 34, no. 3, 1966 p 503–508
(Contract NASw-1496)
(NASA-TT-F-10721) CFSTI: HC $3.00/MF $0.65 CSCL 06M

The viability of microorganisms under conditions of extreme dryness, irradiation and temperature, approximating those on Mars, was investigated in the Darvaza, Repetek and Dushak regions of Turkmenia, USSR in July, 1964. Air and soil temperature, CO_2

liberated by the soil, and total N_2 content were measured. It is found that water is more important for mass reproduction of microorganisms than organic matter. Author

N67-28223*# International Information Inc., Philadelphia, Pa.
COACERVATES AND ENZYMES. PROTEIN–CARBOHYDRATE COACERVATES AND β-AMYLASE [KOATSERVATY I FERMENTY. BELKOVOUGLEVODNYYE KOATSERVATY I β-AMILAZA]
T. N. Yevreinova, T. A. Shubert, and M. N. Nestyuk Washington, NASA, Jan. 1967 8 p refs Transl. into ENGLISH from Dokl. Akad Nauk SSSR (Moscow), v. 105, no. 1, 1955 p 137–140
(Contract NASw-1499)
(NASA-TT-F-10685) CFSTI: HC $3.00/MF $0.65 CSCL 06A

The feasibility of the decomposition of starch in coacervate drops by enzymatic activity to low-molecular products, i.e., sugars is examined. In the solution of the problem, use was made of β-amylase, which decomposes starch primarily with the formation of maltose. The enzyme was obtained from soybeans. The preparation was active at pH 3.6–7.0. Therefore, for studying its activity, coacervates were selected which form at pH 4.4–4.8. In coacervate drops, containing gum arabic, gelatine, starch, and the enzyme β-amylase, the process of decomposition of starch to low-molecular compounds, i.e., sugar, has been shown. Author

N67-28255# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
NEURAL INFORMATION PROCESSING IN THE PERIPHERAL AUDITORY SYSTEM OF THE GUINEA PIG
George R. Hanna Dec. 1966 27 p refs
(AMRL-TR-66-87; AD-649556) CFSTI: HC $3.00/MF $0.65

A number of first and second order neurons of the guinea pig auditory system were studied extensively in an attempt to determine the method by which information is conveyed. Single neuron electrophysiological techniques with anatomical controls were used in the study and in response to several different stimuli, various response patterns were observed. Statistical methods of analysis, using a digital computer, were employed. Each fiber in the auditory nerve appears to convey only fragmentary information; therefore, the information carried by a number of fibers is required to extract all the information about a single signal. The data suggest that a pulse density modulation system of encoding is used, in which the carrier appears to be the irregular spontaneous background activity, the pulse density of which is actively increased and decreased to convey information about both pitch and loudness. The system appears to be much more sensitive to sound changes than to absolute values. For example, pulse density correlated far better with rate-of-change of stimulus intensity than with absolute levels of intensity. In addition to frequency and amplitude, the interval between successive stimuli may be an important parameter of stimulation. Author (TAB)

N67-28281*# National Aeronautics and Space Administration, Washington, D. C.
EXCRETION OF SULFURIC AND PHOSPHORIC ACIDS DURING PHYSICAL ACTIVITY [SCHWEFELSAURE- AND PHOSPHORSAURE-AUSSCHEIDUNG BEI KORPERLICHER ARBEIT]
George J. Engelmann Dec. 1966 13 p refs Transl. into ENGLISH from Arch. Anat. Phys., 1871 p 14 30
(NASA-TT-F-10487) CSCL 06A

The author describes and discusses a series of experiments on the sulfuric acid and phosphoric acid elimination with respect to the excretion of nitrogen. The experiments were conducted in man and took into consideration the objection that because of this complicated diet, man is useless for experiments on metabolism. The author concludes that physical activity increases the excretion of sulfuric and phosphoric acid; that urea is decreased with moderate activity; that excretion of sulfuric acid, rather than of urea, is an accurate indicator of albumin decomposition; and that excretions of sulfuric acid, phosphoric acid, and urea are not comparable. Author

N67-28291*# International Information, Inc., Philadelphia, Pa.
HYDROGEN: THE CARRIER OF LIFE
M. Taube Washington, NASA, Feb. 1967 101 p refs Transl. into ENGLISH of the book "Wodorpierwiastek Zycionosny Przyczynek do Biologii Atomowej" Warsaw, Nucl. Energy Inform. Center, 1965 138 p
(Contract NASw-1499)
(NASA-TT-F-10712) CSCL 06A

The possibilities of a spontaneous abiogenic synthesis in nonliving surroundings, of molecules being the carriers of inner media, energy store, information store, and able to transport energy and information, have been considered. The hypothesis of a possible existence of life (in cosmic scale) apart from hydrogen compounds, especially beyond the liquid hydrogen oxide medium, have been critically rated. The eventual existence of life forms apart from hydrogen, oxygen, and carbon (i.e., of "non-carbon" life forms) has been eliminated from further considerations. There have been given sufficient reasons to support the thesis postulating that the unique life carrier in cosmic scale is hydrogen and its compounds with oxygen, carbon, nitrogen, and phosphorus (and sulphur). Author

N67-28323# Aerospace Medical Div. Arctic Aeromedical Lab., Fort Wainwright, Alaska.
DIETARY MODIFICATIONS OF COLD-INDUCED METABOLIC EFFECTS
David A. Vaughan, Lucile N. Vaughan and Harold D. Stull Feb. 1967 15 p refs
(AAL-TR-66-12; AD-649326) CFSTI: HC $3.00/MF $0.65

Cold-exposed male Sprague-Dawley rats were forced to obtain their extra caloric requirements from either carbohydrate (sucrose) or fat (Crisco). Rats were killed, one, four and eight weeks after initiation of the feeding regimen. Carcass fat, protein, and moisture analyses were made. Liver glucose-6-phosphatase (G-6-Pase), hexose monophosphate (HMP) dehydrogenase, and glycogen were assayed. At the end of four weeks and eight weeks the percentages of fat in the carcasses of rats were significantly higher than in the cold-exposed rats receiving a mixed complete diet ad libitum. The two enzymes studied showed differing responses, HMP dehydrogenase increasing as a result of higher input of carbohydrate in the cold, and G-6-Pase increasing as an apparent result of cold exposure per se. Author (TAB)

N67-28505# Zurich Univ. (Switzerland).
ELECTRON MICROSCOPIC AND MORPHOMETRIC STUDY OF RAT LUNGS EXPOSED TO 97% OXYGEN AT 258 TORR (27,000 FEET) Research Report, Feb. 1964–Jul. 1965
Gonzague S. Kistler, Ewald R. Weibel, and Peter R. B. Caldwell (AMRL) Wright-Patterson AFB, Ohio, AMRL, Dec. 1966 21 p refs
(Contract AF 61(052)-784)
(AMRL-TR-66-103; AD-649542) CFSTI: HC $3.00/MF $0.65

A group of young growing rats was exposed to 97% oxygen at 258 torr in a controlled environmental chamber. They were sacrificed in groups after 1, 5, and 14 days and their lungs were processed for morphometric examination in light and electron microscope according to standardized procedures. No qualitative pathologic changes in lung structure were found even after 2 weeks of oxygen exposure. Only one exception was an apparent increase in the number of eosinophilic granulocytes within the lung capillaries of test rats which had been exposed to pure oxygen for 5 and 14 days. In the test animals a fall in lung volume and in lung-volume-to-body-weight ratio was concurrent with impairment of body growth. Morphometric analysis revealed a statistically high significant decrease in alveolar surface area, capillary surface area, and volume in dependence of the duration of oxygen exposure.

These changes are interpreted as 'oxygen effect' which, however cannot be called 'oxygen toxicity' proper. Rather they are regarded as adaptation of the (growing) organism to increased oxygen tension in the breathing medium. Author (TAB)

N67-28511# Bunker-Ramo Corp., Canoga Park, Calif.
THE METHODOLOGY OF CONTROL PANEL DESIGN Final Report, 1 Feb. 1964–30 Apr. 1965
D Meister and D. E. Farr Wright-Patterson AFB, Ohio, AMRL, Sep. 1966 78 p refs
(Contract AF 33(615)-1350)
(AMRL-TR-66-28, AD-646442)

Nine control panel drawings were developed by designers using standard design criteria from a designer's guide. The drawings were then evaluated by five experts representing the disciplines of human factors, industrial design, maintainability and reliability engineering. Sample panels were mocked up and subjects were tested in operational use of these panels. The major results of the overall study was that: (1) designers manifest a high degree of variability in developing control panel drawings even when presented with a standard package of design information; (2) human engineering design criteria appear to be significant only in relation to anticipated operator performance characteristics, and difficulties in applying these criteria stem from lack of empirical knowledge of these relationships; (3) a major source of difficulty in securing the application of human engineering design criteria by designers is the latters' lack of a system-behavioral approach to design. The major need in the control panel design area is empirical research to refine and standardize simple and quickly applied evaluation techniques. More information is needed concerning the manner in which designers utilize human factors and other design inputs. TAR

N67-28517 Johann-Wolfgang-Goethe-Universitat, Frankfurt am Main (West Germany).
ON THE RADIATION SENSITIVITY OF BACTERIA [UEBER DIE STRAHLENEMPFINDLICHKEIT VON BAKTERIEN]
Maria Kraft (Ph.D. Thesis) 1962 106 p refs In GERMAN Supported by the Max Planck-Inst. fuer Biophys., Frankfurt am Main

The initial purpose of the present work was to determine the minimum dose that affects microorganisms biologically. Experiments were conducted by irradiating E. coli B with X-rays. The dependence of radiation sensitivity on age of the culture, the nutrient medium, and air circulation was studied. The reaction to radiation was found to depend strongly on the physiological condition of the bacteria. It was also shown that apparently undamaged bacteria which remained capable of forming colonies were affected by the radiation directly and, in addition, by the presence of bacteria destroyed through radiation. Transl. by K.W.

N67-28544# Illinois Univ., Urbana. Training Research Lab.
CONTEXTUAL PREDICTABILITY AND FREQUENCY FACTORS
Domenico Parisi, Ulderico Cappelli, and Lawrence M. Stolurow Aug. 1966 15 p refs
(Contract Nonr-1834(36); ARPA Order 454)
(TR-41; AD-651095) CFSTI: HC $3.00/MF $0.65

Cloze scores were obtained from 320 Ss for two written Italian passages totaling 616 words in such a way that each word was guessed by 32 Ss. Each word was classified into one of 12 grammatical classes. As has been found for English, content words are less predictable than function words if guessing the specific missing item is required. No such difference exists when only correct form class has to be predicted. Type-token ratio for each class appears to be correlated with specific item predictability, whereas proportion of occurrences of each form class in the language is correlated with form class predictability. Both correlations suggest that frequency properties may be an important factor even in complex language behavior. Author (TAB)

N67-28546# Tracor, Inc., Austin, Tex.
STUDIES OF BINAURAL INTERACTION Summary Report
Walter T. Bourbon 1 Apr. 1967 82 p refs
(Contract Nonr-4193(00))
(TRACOR-67-372-U; AD-651145) CFSTI: HC $3.00/MF $0.65

The series of basic studies in binaural interaction continued with emphasis on two areas of investigation: manipulation of observers' criterion in auditory detection and critical bands of tonal stimuli. Work on a third area, detectability of tonal signals under conditions of azimuth certainty was also continued. TAB

N67-28604# Bunker-Ramo Corp., Canoga Park, Calif. System Effectiveness Lab
A FURTHER STUDY OF THE USE OF HUMAN FACTORS INFORMATION BY DESIGNERS Final Report, 16 Sep. 1966–15 Mar. 1967
David Meister and Dennis J. Sullivan 16 Mar 1967 100 p refs
(Contract Nonr-4974-00)
(AD-651076) CFSTI: HC $3.00/MF $0.65

The study was performed to verify an earlier investigation which concluded that designers had little or no interest in human factors information and usually failed to apply human factors criteria to design. Ten designers from the Douglas Aircraft Company were presented with 3 4-hour tests in which they were required to develop equipment drawings, solve design problems analytically, rate the importance of design parameters, use MIL-STD-803 and similar documents, and review human factors handbook material. The general conclusions resulting from the earlier study was verified. Design analysis involved primarily the equipments mechanical/electrical functioning. Subjects showed little interest in or ability to apply human factors data to their design problems. Internal components and equipment structure determined the selection and arrangement of controls and displays. Human factors was not recognized as a distinct discipline, nor were human factors problems in design recognized as such. There was almost no use of human factors specialists to resolve such problems. As was found in the earlier study, human factors information in handbook form is not acceptable to designers because of its academic mode of presentation and because much of the material is non-applicable to design problems. Much of the material in human factors standards is not considered to be mandatory in controlling design. Author (TAB)

N67-28635# Naval Submarine Medical Center, Groton, Conn
AN EVALUATION FOR USE IN AUDIOMETRY OF THE NOISE ATTENUATION OF THREE TYPES OF CIRCUMAURAL EARMUFFS
Cecil K. Myers 23 Jan. 1967 14 p refs *Its* Memo Rept.-67-1
(AD-650097) CFSTI: HC $3.00/MF $0.65

In a study designed to find the best circumaural muff for routine testing of hearing, especially in group testing situations, three good quality circumaural muffs, commercially available, were compared. The Otocup was found superior in noise-attenuation properties. Data is presented which should be useful as a base for equipment specifications for audiometric clinics. Author (TAB)

N67-28698# RAND Corp., Santa Monica, Calif.
A THEORETICAL MODEL OF THE CORNEA FOR USE IN STUDIES OF TONOMETRY
C. C. Mow Apr. 1967 26 p refs Presented at the 4th Intern. Corneal Biophys. Workshop, Los Angeles, 9–10 May 1967
(P-3584; AD-651107) CFSTI: HC $3.00/MF $0.65

A theoretical model of the cornea, based on corneal dimensions and observed properties, is presented. It is shown that because of large differences in the thicknesses of the Bowman's and Descemet's membranes and the stroma; and because of the reported large differences in the elastic properties of the layers, a sandwich-shell model is a good approximation for the study of corneal deformation. The theory is applicable for applanation

tonometry. A set of equilibrium equations based on Reissner's theory is given. Shell parameters which determine the behavior of shells are expressed in terms of the corneal properties and dimensions. Numerical examples which show the effects of corneal parameters on the stress resultants due to intraocular pressure are also given. Author (TAB)

N67-28706 Royal Aircraft Establishment, Farnborough (England).
PROTOPLASMIC STREAMING [PROTOPLASMASTROMUNG]
N. Kamiya Jan. 1967 21 p refs Transl. into ENGLISH from Protoplasma (Wien), v. 53, 1961 p 600-614
(RAE-LIB-TRANS-1208) CFSTI: HC $3.00

The problem of cytoplasmic streaming has been considered in two organisms, nitella and a myxomycete plasmodium. The force of cyclosis on streaming in intact nitella cells is measured by means of a centrifuge, a figure of 1 or 2 dynes per square centimetre is given. Streaming is shown to persist in segments of cells tied off and to be most vigorous at regions adjacent to the cortex. Chloroplasts in isolated drops of cytoplasm are shown to revolve rapidly. Cytoplasmic streaming force in plasmodium is measured by means of a special double chamber. The organism itself is the connecting link between the two parts of the double chamber, thus pressure changes in one part of the chamber are transmitted via the organism to the other part. By this means it is possible to counterbalance the motive force of streaming within the organism and to construct "dynoplasmograms". Inhibitors of respiration are not found to have any effect on motive force whereas inhibitors of glycolysis do have an effect. Author

N67-28720# Cornell Univ., Ithaca, N. Y. Cognitive Systems Research Program.
ON THE NEURAL MODELING OF SPEECH PROCESSES
Charles C. Tappert (Ph.D. Thesis) 15 Dec. 1966 178 refs
(Contract Nonr-401(40); Grant NSF-GK-250)
(Rept.-9; AD-649160) CFSTI: HC $3.00/MF $0.65

The work concerns the neural modeling of the human processes of speech production and perception. Part of this study deals with a new technique of speech synthesis. Newly defined generalized parameter waveforms, produced by an electronic waveform generator, are employed to approximate acoustic parameter transitions in the synthesis of dyad segments. The study also employs computer simulation studies to investigate neural models of: (1) the speech recognition process; (2) the control of speech production at the neural command level; and (3) feedback systems in the speech acquisition processes of babbling and mimicking. One of the preprocessing systems for speech recognition employs a new technique of detecting time sequences of features. In modeling these processes emphasis was on adaptive networks. Author (TAB)

N67-28746*# National Aeronautics and Space Administration, Washington, D. C.
PHYSIOLOGICAL MEASUREMENTS IN SPACE-PRINCIPLES AND METHODS [FIZIOLOGICHESKIYE IZMERENIYA V KOSMOSE. PRINTSIPY I METODY]
V. V. Parin, B. B. Yegorov and R. M. Zayevskiy Feb. 1967 17 p refs Transl. into ENGLISH from the Russian Presented at 17th Intern. Astron. Cong., Madrid, 9-15 Oct. 1966
(NASA-TT-F-10678) CSCL 06B

The shift in physiological monitoring from the rudimentary safety requirements during early space flights to a systematic study of biological subjects by flight physicians and by means of sophisticated instrumentation is traced. Clinical-physiological tests modified for space flight application and newly developed procedures are discussed, including seismocardiography, variation pulsometry, and analysis of the motofacient act of handwriting. The use of these procedures aboard the Voskhod spacecraft and in connection with animal experiments aboard the Cosmos satellites is summarized. Sample results are included of an experiment with dogs that included application of various stimuli, administration of pharmacological substances, and study of the reaction to prolonged weightlessness. Requirements for future space flights are pointed out, and principles were formulated for the design of new systems for physiological measurements and data transmission. K.W.

N67-28754*# Sperry Phoenix Co., Ariz.
AVIONICS REQUIREMENTS FOR ALL WEATHER LANDING OF ADVANCED SST's. VOLUME II: STATE-OF-THE-ART REVIEW OF ALL WEATHER LANDING SYSTEM TECHNIQUES Final Report
S. S. Osder Apr. 1967 108 p refs
(Contract NAS2-4124)
(NASA-CR-73093) CFSTI: HC $3.00/MF $0.65 CSCL 05H

Display concepts and techniques for flight control and approach are reviewed in connection with human factors. The technology of electromagnetic reference systems and devices for all-weather landing (AWL) applications are assessed, including instrument landing systems, cooperative ground radar/data link systems, advanced integrated landing systems, artificial imaging, and navigational aids. A summary is presented of the control configurations used in present-day jet transport automatic landing systems. A discussion of redundancy and monitoring techniques covers pertinent terminology, summed composite signal transmission, mid-value logic systems, triplex switched single output systems, high gain/low saturation systems, triplex AWL system reliability, and the complexity of redundancy. K.W.

N67-28829*# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
EVALUATION OF FUEL CELL WATER FOR HUMAN CONSUMPTION
Bernard J. Katchmann, Carol Linder (Miami Valley Hospital), Sheldon A. London, Arselus West, and George Kitzes et al Nov. 1966 15 p refs
(Contract AF 33(657)-11716)
(NASA-CR-84845; AMRL-TR-66-141) CFSTI: HC $3.00/MF $0.65 CSCL 06K

Water obtained from a hydrogen-oxygen fuel cell was subjected to chemical, organoleptic, and microbiological analyses and found to be acceptable according to the U.S. Public Health Service Standards. To ascertain the acceptability of this water, eight male subjects were confined to a self-care unit at Miami Valley Hospital, Dayton, Ohio, for a 2-week period and served a controlled 4-meal-per-day diet, low in water content. A minimum of 2 liters per day of either distilled water or fuel cell water was drunk by the subjects as follows: two subjects were served distilled water for 2 weeks, serving as controls; four were served fuel cell water for 2 weeks; and two were served fuel cell water for one week, followed by distilled water for the second week. Twenty-four hour surveillance of the subjects was maintained. They were examined by a physician at least once daily; daily urinary and periodic blood samples were taken for routine laboratory examination. The subjects showed no clinical symptoms at the end of the test period, and the fuel cell water was found to be as acceptable as distilled water in constituting part of a daily diet for the 2-week period. Author

N67-28866# Du Pont De Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
AN ALPHA-COUNTING HAND AND FOOT MONITOR
William J. Woodward Jan. 1967 20 p refs
(Contract AT(07-2)-1)
(DP-1080) CFSTI: HC $3.00/MF $0.65

An instrument was developed for detection of alpha contamination on hands and feet. A practical alpha foot monitor was made possible by improvements in the aluminum-coated film used to cover the scintillation detectors. In the instrument, scintillation detectors are connected to counters made from standardized plug-in circuits developed at the Savannah River Laboratory. Author (NSA)

N67-28885# Lockheed-Georgia Co., Marietta.
PERFORMANCE AND PHYSIOLOGICAL EFFECTS OF LONG TERM VIBRATION Final Report, 7 Jul. 1966–1 Jun. 1966
C. L. Holland, Jr. Wright-Patterson AFB, Ohio, Aerospace Med. Res. Labs, Oct. 1966 61 p refs
(Contract AF 33(615)-2921)
(ER-7979-12; AMRL-TR-66-145; AD-649366) CFSTI: HC $3.00/MF $0.65

The present study was designed to investigate human performance as a function of selected parameters of simulated, random, vertical vibration environments. Twelve volunteers were subjected to four different vertical vibration environments for 6 hours at a session. The vibration environments varied with respect to acceleration level (0.12G rms and 0.16G rms) and with respect to the frequency distribution of acceleration power. Both acceleration power density spectra employed had significant frequency components in the frequency range of 1 to 6 cycles per second, but differed in the location of peak acceleration power. During vibration and control sessions, subjects were required to perform a task complex that included two-dimensional, compensatory tracking and secondary visual and auditory loading tasks. Performance measures were taken for 45 minutes of each hour. Heart rate, respiration rate, and skin temperature measures were also recorded. Tracking error scores on both axes were significantly larger under all vibration conditions than those scores obtained during static test sessions. The two acceleration levels investigated did not differentially affect tracking error. The results of a supplemental investigation indicated that tracking performance was degraded more by a spectrum that had peak power at 5 cps than one with a similar frequency content but with a peak power at 2 cps.
Author (TAB)

N67-28886# Federal Fire Council, Washington, D. C.
HAZARDS OF CARBON TETRACHLORIDE FIRE EXTINGUISHERS: RECOMMENDED PRACTICES NUMBER 3
Jan. 1967 39 p refs
(AD-649465) CFSTI: HC $3.00/MF $0.65

The report attempted to present just a few of the highlights of the history of the chemical liquid known as carbon tetrachloride. Some of its early uses in medicine and its later applications in industry and as a fire extinguishant were discussed. The toxicity of carbon tetrachloride, particularly with reference to its use as a fire extinguishant, was examined in some detail. And finally, its efficiency in extinguishing fires in hydrocarbon fuels was analyzed.
Author (TAB)

N67-28892# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SPACE BIOLOGY AND THE MAGNETIC FIELD [KOSMICHESKAYA BIOLOGIYA I MAGNITNOYE POLE]
Yu. A. Kholodov 31 Jan. 1967 8 p Transl. into ENGLISH from Priroda (Moscow), no. 4, 1966 p 114–115
(FTD-HT-66-717; AD-649340) CFSTI: HC $3.00/MF $0.65

The use of magnetic fields as a means of protecting spacecraft from ionizing radiations is mentioned in terms of the prolonged exposure of future astronauts/cosmonauts and other biological objects to either very weak or very strong fluxes. It is argued that magnetic fields have been shown to affect organisms up to the primate level strongly under certain conditions. Therefore, it is proposed that on the basis of this and other observations by Soviet researchers it may be expedient to create different magnetic fields for different spacecraft compartments, e.g., intense magnetic fields to stimulate Chlorella growth and terrestrial fields for cosmonauts. The author asserts that studies of the biological effects of magnetic fields cannot be overlooked; studies of the influence of magnetic fields on living processes which are being widely carried out by both Soviet and Western researchers not only will assure the safety of future spaceflights but will open up new areas in terrestrial biology.
Author (TAB)

N67-28898# Naval Medical Research Inst., Bethesda, Md.
GAS CHROMATOGRAPHIC ESTIMATION OF CARBON MONOXIDE PRODUCED DURING OXYGEN ABSORPTION BY ALKALINE PYROGALLOL
Harold A. Collison and Frederick Lee Rodkey 28 Feb. 1967 11 p refs
(Rept.-14; AD-649327) CFSTI: HC $3.00/MF $0.65

Oxygen absorption by alkaline pyrogallol caused the formation of about 0.001 ml of carbon monoxide for each ml of oxygen absorbed. Larger amounts of CO were produced when the oxygen absorption capacity of the pyrogallol was nearly expended by absorption of more than 20 ml of oxygen per ml of pyrogallol. No carbon monoxide was produced when oxygen was absorbed with Fieser's solution. The use of Fieser's solution is recommended for oxygen absorption when minimal amounts of carbon monoxide are required in the residual gase.
Author (TAB)

N67-28904# Melpar, Inc., Falls Church, Va.
UTILIZATION OF INFRARED SPECTROPHOTOMETRY IN MICROCONTAMINANT STUDIES IN SEALED ENVIRONMENTS Final Report, 2 Jun.–29 Jun. 1965
Hannibal de Schmertzing and Julian H. Chaudet Brooks AFB, Texas, School of Aerospace Medicine, Jan. 1967 27 p ref
(Contract AF 41(609)-1962)
(SAM-TR-67-2; AD-650000) CFSTI: HC $3.00/MF $0.65

The purpose of this work was to determine microcontaminants in a sealed environmental system. The separation and identification of the collected samples were accomplished with gas-liquid chromatography and infrared spectrophotometry. Fifth-four sets of samples of the atmosphere from a Brooks Air Force Base space cabin simulator, comprising 162 individual samples, were analyzed. The method used was gas-liquid chromatography using a flame ionization detector. The retention time on the column was used for identification, while the peak area was used for quantitative estimation of the compounds. A collection of the vapor infrared spectra of 146 compounds, which are possible contaminants for space cabin simulators, has been compiled during the 2 years of this contract. A computer program for sorting infrared spectra with the aid of the ASTM deck of infrared cards has been established. Analyses have been made of gases evolved from paint panels, from the decomposition of a Teflon insulator, and from human waste products.
Author (TAB)

N67-28957# Pennsylvania State Univ., University Park. Ordnance Research Lab.
THEORIES OF BAT ECHOLOCATION
M. A. Mogus 15 Feb. 1967 68 p refs
(Contract NOw-65-0123-d)
(AD-650476) CFSTI: HC $3.00/MF $0.65

The aspects of bat performance most significant to the theories of echo location may be considered as range measurement, range resolution, target direction, resistance to jamming and the use of various types of ultrasonic pulses and repetition rates. The radar analogy theory first suggested by Hartridge and later expanded by Strother offers an heuristic explanation for most of the above. It explains range measurement, range resolution and resistance to jamming. The beat frequency theories attempt to explain the determination of range and direction, but not resolution, resistance to jamming or the changes in the pulse rates. Their major difficulty is that they may be applied only where overlap of pulse and echo is known to occur. The time difference tone theory explains only range measurements and considers the change in pulse rate and length as yielding more information on target range. Range resolution is not considered. The beat frequency and time difference tone theories possess two major difficulties. The first is that they depend upon the echo being audible to the bat. The second is that all experiments upon which these theories depend were conducted with human subjects.
Author (TAB)

N67-28959# Texas Univ., Austin. Dept. of Psychology.
A COST-REWARD ANALYSIS OF REACTIONS TO EXTREME STRESS
Roland Radloff and Robert Helmreich Mar. 1967 103 p refs
(Contract N00014-67-A-0126-0001)
(TR-1; AD-650153) CFSTI: HC $3.00/MF $0.65

The report, based on analysis of the data from Project SEALAB II, represents an attempt to apply the costs, rewards and outcomes approach of Thibaut and Kelley (1959) to physically and psychologically stressful situations. The model proposes that persons will enter hazardous or other high cost environments voluntarily because of perceived benefits and that costs tend to be quite stable and rewards highly labile in environments characterized by negative physical stimuli. It is suggested that in developing social systems which are high in such costs, the rewards will decline more rapidly than costs (for example, the rewards in terms of prestige and public honors have declined more rapidly for successive Astronauts than have the costs in terms of physical hazard). This relatively rapid decline of rewards in comparison with costs can be expected to have negative effects on performance and adjustment in such situations and on volunteer and retention rates as well. The leadership role in relation to the cost-reward structure is analyzed and evidence in support of the model is cited. Author (TAB)

N67-28964# Service Bureau Corp., New York.
NEUROMIME NETWORK SIMULATOR Final Report, 19 Mar. 1963–15 Apr. 1966
James Flaugher Wright-Patterson AFB, Ohio, AMRL, Sep. 1966 137 p refs
(Contract AF 33(657)-11194)
(AMRL-TR-66-101, Vol. I; AD-650576) CFSTI: HC $3.00/MF $0.65

Because of the large number of network combinations and parameter variations possible in a Steele neuromime network, a program for simulating the nets on a digital computer is being developed to aid in determining the most efficient nets for specific tasks. The results of the investigation of network and parameter variations may then be used as the restraints and design criteria for neuromime devices with specific signal recognition capabilities. The simulation provides as a tool, a means of generating randomly connected networks with desired statistical restraints and a training phase which alters the network in such a manner as to force the actual response closer to the desired response. The generalized nature of the nets used is the essence of the research effort. Author (TAB)

N67-28974# Human Factors Research, Inc. Santa Barbara, Calif.
TRANSLATION AND APPLICATION OF PSYCHOLOGICAL RESEARCH
Robert R. Mackie and Paul R. Christensen Jan. 1967 151 p refs
(Contract Nonr-4337(00))
(TR-716-1; AD-650309) CFSTI: HC $3.00/MF $0.65

The processes involved in translating the findings of laboratory research in psychology into forms that would be meaningful and useful in operational settings are examined in detail. Particular attention is directed toward the psychology of learning and its apparently limited impact on educational and training technology. The viewpoints of academically and practically oriented psychologists toward various problems related to the translation and application of research are described and discussed: (1) the limited amount of effort being directed toward applications; (2) the detachment of many researchers from operational problems; (3) the narrowness of problem definition characteristic of theory-oriented research; (4) the problems involved in identifying theoretical and laboratory variables in the operational setting; (5) the effect of the choice of experimental stimulus and task conditions on the translatability of research; (6) the specificity of research results in relation to experimental, task and subject variables; (7) the need for short, synoptic summaries of research studies as an aid to collation, interpretation and translation; and (8) the need for the development of learning engineers as a link between the research and educational communities. A number of specific recommendations are made in the interest of increasing the relevance and applicability of psychological research sponsored by mission-oriented agencies in the Navy. Author (TAB)

N67-28990# RAND Corp., Santa Monica, Calif.
MATHEMATICAL ANALYSIS AND DIGITAL SIMULATION OF THE RESPIRATORY CONTROL SYSTEM
Fred S. Grodins, June Buell, and Alex J. Bart Mar. 1967 54 p refs
(Contract F44620-67-C-0045; Proj. RAND)
(RM-5244-PR; AD-650132) CFSTI: HC $3.00/MF $0.65

The report expresses the basic material balance relationships for the lung-blood-tissue gas transport and exchange system in a set of differential-difference equations containing a number of dependent time delays. Additional equations define the chemical details of transport and acid-base buffering, concentration equilibria, and blood flow behavior. Finally, a control function is included defining the dependence of ventilation upon CSF (H(+)), and arterial (H(+)) and PO2 at the carotid chemoceptors. A Fortran program was written for convenient digital simulation of the responses of the system to a wide variety of forcings, including CO2 inhalation, hypoxia at sea level, altitude hypoxia, and metabolic disturbances in acid-base balance. Both dynamic and steady-state behavior of the model were reasonably realistic. Author (TAB)

N67-29002*# Farnum (Frank C.) Co., Philadelphia, Pa.
OXYGEN BALANCE OF THE BODY DURING EXTENDED ACCELERATIONS [KISLORODNY BALANS ORGANIZMA PRI DLITEL'NYKH USKORENIYAKH]
A. S. Barer, G. A. Golov, V. B. Zubavin, Ye. I. Sorokina, and Ye. P. Tikhomirov Washington, NASA, Jan. 1967 8 p refs Transl. into ENGLISH from a Russian Paper Presented at the 17th Intern. Astronautical Congr., Madrid, 9–15 Oct. 1966
(Contract NASw-1497)
(NASA-TT-F-10682) CSCL 06S

At increasing accelerations (8–12 g) various data collected from white rats and humans show: (1) quickening and increased depth of respiration; (2) decrease in vital capacity by a gradient of ca. 200 ml/g; (3) increase in total oxygen consumption and CO_2 release; (4) increase in % of oxygen in exhaled air and decrease in percentage of CO_2; (5) decrease in HbO_2. There was clear correlation between the longitudinal component of acceleration and the level of circulation in the cerebral vessels (vector at angles of 65° and 80°). Author

N67-29020*# International Information, Inc., Philadelphia, Pa.
THE CIRCULATION DURING ACCELERATION. ROENTGENKYMOGRAPHIC RECORDING DURING CHANGES IN ACCELERATION [DER KREISLAUF UNTER BESCHLEUNIGUNG. RONTGENKYMOGRAPHISCHE AUFNAHMEN BEI BESCHLEUNIGUNGSANDERUNG]
H. Peiffer Washington, NASA, Jun. 1967 16 p refs Transl. into ENGLISH from Luftfahrtmedizin (Germany), v. 3, 1939 p 82–96
(Contract NASw-1499)
(NASA-TT-F-11060) CSCL 06S

Centrifuge acceleration experiments were performed on six monkeys after Thorotrast injections. Kymograms of the heart filling were achieved by using a roentgenkymograph. Within one second after the centrifuge stops, normal conditions prevail in the heart filling. When the centrifuge is started, the filling decreases slowly, and when acceleration is applied for longer periods, the blood accumulates in the liver. The changes in heart filling are primarily dependent on the physical make-up of the animal during increasing acceleration. Author

N67-29091# Admiral Corp., Chicago, Ill.
X-RAY MOTION MONITOR: LOW-DOSAGE, WIDE-VARIABLE-FIELD TELEVISION RADIOGRAPH FOR BIODYNAMIC ANALYSIS Final Report, May 1964–Dec. 1965
William Leysath and Edmund B. Weis, Jr. (AMRL) Wright-Patterson AFB, Ohio, AMRL, Dec. 1966 44 p refs
(Contract AF 33(615)-1878)
(AMRL-TR-66-104; AD-650481) CFSTI: HC $3.00/MF $0.65

The X-Ray Motion Monitor provides a new and versatile tool for experiment and research work in the field of biodynamics. The equipment essentially consists of a pulsed x-ray source synchronized with a closed circuit TV system, utilizing a fluorescent intensifying screen to convert the x-rays into a visible pattern. The head portions of the equipment are designed to withstand acceleration up to 147 meters/sq sec while rigidly mounted to a test platform, and up to 392 meters/sq sec on special shock fixtures designed for drop tests. The light output of the fluorescent screen is matched with the spectral response of the image orthicon tube in the TV camera to provide peak performance while employing extremely low x-ray dosages. The x-ray source is pulsed on for only 1/16 of the total observation time (1 millisecond for every 16.7 milliseconds). The system permits visual observation, and/or cine or video tape recording, of an x-ray view up to a size of 20 by 30 inches of the internal organs of a live test subject while under acceleration or shock. In addition, special video processors in the system provide voltage analog outputs corresponding to the movements of selected internal targets in relation to some fixed internal or external reference points. These analog signals can be recorded by graphic recording devices for reference and later analysis. Author (TAB)

N67-29096# Raytheon Co., Waltham, Mass.
IN SEARCH OF MATHEMATICS FOR BIOLOGY Final Report, 1 Nov. 1966–31 Jan. 1967
John M. Myers Apr. 1967 63 p refs
(Contract F44620-67-C-0032)
(S-932; AFOSR-67-0893; AD-650404) CFSTI: HC $3.00/MF $0.65

An account is given of the inquiries and reflections of a physicist and applied mathematician who explored problems in biology from the viewpoint that the development of information processing systems of organisms must occur in a sufficiently rule-like way to be mathematically describable. The report considers: (1) bases for the supposition of transformation generating principles that are rooted both in evolutionary and developmental phenomena; (2) a comparison of beginnings of results in artificial intelligence and results of research on relevant biological structure; and (3) efforts to devise new kinds of mathematics for biology. Analogies are discussed between electronic and nervous circuits with the observation that the analogy between the brain and a very fancy circuit is an analogy between a brain which we do not understand and a circuit that is completely outside our experience with circuits and which we do not understand either. Considerations of perception and context lead to the statement that an organism can be taken as the expression of a point of view, and a point of view can be taken as a partitioning of the of the universe into classes of equivalence of response. Thus, a characteristic feature of a mathematical representation of structure would come from the credibility that a point of view attributes to other points of view. Though consideration of relations between points of view led back to those that stem from sets, a set may be an expression of a point of view that is yet, in the biological sense, to be described mathematically. Author (TAB)

N67-29099# RAND Corp., Santa Monica, Calif.
A GENERAL BUILDING BLOCK FOR DIRECT MODELING
Norman B. Reilly Apr. 1967 41 p refs Submitted for publication
(P-3528; AD-650130) CFSTI: HC $3.00/MF $0.65

The direct modeling of a physical process involves the use of empirically defined logical building blocks and their interconnections to mimic the complete observed or postulated behavior of a process. The approach has a number of advantages dealing with the enhancement of intuitive interaction, the bypassing of certain mathematical difficulties, and the minimizing of interruptions. The growing needs for such a tool are reflected in current writings and are discussed in the report. A specific building block is suggested and examples of its application to different problem areas are given. A general discussion deals with questions of economy, mathematics, and physical realization. Author (TAB)

N67-29101# Naval Submarine Medical Center, Groton, Conn. Submarine Medical Research Lab.
THE RESPONSE ANALYSIS TESTER (RATER) AND LOGICAL INFERENCE TESTER (LOGIT): I. SOME PRELIMINARY FINDINGS
James W. Parker 2 Feb. 1967 20 p refs
(SMRL-487; AD-650182) CFSTI: HC $3.00/MF $0.65

The report presents the results of preliminary work with two performance testing devices. One (RATER) measures choice reaction time or the time required to respond to four different colored lights presented in random order for five minutes by pressing the corresponding correct button. The other device (LOGIT) measures the ability to solve problems concerned with determining the correct sequential order in which twenty buttons are pressed in order to light the board. Data are presented for comparing the scores for any group tested on the RATER with a typical Navy population. Results with LOGIT show it to be potentially useful for determining performance decrements during exposure to unusual environments, such as high pressure, confinement, or Helium-oxygen breathing mixtures. Author (TAB)

N67-29110# Oxford Univ. (England). Dept. of Human Anatomy.
RECIPROCAL CONTROLS BETWEEN NERVOUS SYSTEM AND ENDOCRINE SECRETION Final Scientific Report, 1 Apr.–30 Sep. 1966
G. W. Harris Feb. 1967 8 p refs
(Grant AF-EOAR-66-10)
(AFOSR-67-0920; AD-651128) CFSTI: HC $3.00/MF $0.65

The investigation was designed to map out some of the forebrain pathways involved in the control of the anterior lobe of the hypophysis. The hypothalamus and parts of the cerebral cortex were stimulated with permanently implanted electrodes and the release of the adrenocorticotropic (ACTH) and of the thyrotropic (TSH) hormones from the pituitary were measured. A technique was developed by which the continuous stimulation of the different parts of the brain can be carried on for days at a time. From such prolonged stimulation, the effects of stimulation should become evident. This is a slow technique, but can be expected to yield information on the effects of over-stimulation of the thyroid gland. This may have immediate practical application, if certain changes occur. Author (TAB)

N67-29127# Bucknell Univ., Lewisburg, Pa.
THE EFFECTS OF FEAR OF FAILURE ON RISK-TAKING AND PERFORMANCE
Richard C. Teevan, Jon Erik Rolf (Minn. Univ.), and Robert C. Birney (Amherst Coll.) Mar. 1967 10 p refs
(Contract Nonr-3591(01))
(AD-650302) CFSTI: HC $3.00/MF $0.65

Three measures of risk-taking and four measures of performance were employed to investigate the effects of fear of failure (FF) on these two variables. All Ss were required to participate in all tests and seven hypotheses were formulated and examined within the general areas stated above. In the area of risk-taking, it was found that as the subjective failure became more intense, the high FF Ss tended to take fewer and fewer risks. Likewise, FF was found to have a debilitating effect on three of the performance tasks employed. The previous finding that high FF Ss set wider confirming intervals (CIs) than low FF Ss was also substantiated. Two questionnaires (Risk-Taking and Performance) were administered in attempts to obtain more direct indices of the effects of FF

motivation in these two areas. Neither questionnaire proved to be as successful as the behavioral measures. Author (TAB)

N67-29128# Human Factors Research, Inc., Santa Barbara, Calif.
TEMPORAL PATTERNS OF SIGNALS AND VIGILANCE PERFORMANCE
James F. O'Hanlon, Jr. and James J. McGrath Mar. 1967 41 p refs
(Contract DA-49-193-MD-2743)
(TR-719-3; AD-651047) CFSTI: HC $3.00/MF $0.65

The role of temporal expectancy in vigilance performance was studied by comparing the performances of subjects who were presented with different temporal patterns of signals. Also studied was the effectiveness of displaying a subjects record of responses over time for the purpose of allowing him to anticipate signal occurrences. Finally the relationship between the subjects performance and rates of subjective time was studied to confirm an earlier finding. To accomplish this, different groups of subjects were given simple, complex and random patterns of signals in daily vigilance tasks for five days. Half of each group used a graphic recorder showing a record of their responses over time and half did not. Their rates of subjective time were measured each day. On the last day all subjects were given their normal pattern during the initial period of the vigilance task but were then switched to the random pattern for the remainder of the task. Findings were: (1) the subjects did not respond to the temporal arrangement of signals but may have responded to the mean and variance of intersignal intervals in the patterns, (2) the graphic recorder interfered with, rather than improved, performance, (3) the abrupt change in pattern on the fifth day had a strong deleterious effect upon the performance of those who had learned the initial pattern, and (4) the subjects performance was related to their rates of subjective time in the expected manner. Author (TAB)

N67-29136# RAND Corp., Santa Monica, Calif.
THE IMPORTANCE OF THE DATA-GENERATING MODEL IN PROBABILITY ESTIMATION
Sarah Lichtenstein (Oregon State Univ.) and George J. Feeney (GE) Apr. 1967 15 p refs
(P-3579; AD-651108) CFSTI: HC $3.00/MF $0.65

When subjects appear to do poorly in a complex probability estimation task, they may be making careful estimates based on a different data-generating model than the one used by the experimenters. Eleven subjects estimated for 150 trials the probability that a dropped bomb had been aimed at one of two cities. Correlations between subjects estimates and probabilities generated by the correct, circular normal model and by a simple, incorrect ratio of distances model showed six subjects using the wrong model with great accuracy. The usual analysis of such data, in which a possible confusion about the data-generation model is disregarded, would have led to the misleading conclusion that these subjects were very inaccurate at the task. Author (TAB)

N67-29137# Texas Univ., Austin. Dept. of Psychology.
ATTITUDINAL EFFECTS OF STRESS AND JUSTIFICATION: A REPLICATION AND EXTENSION
Robert L. Helmreich Apr. 1967 24 p refs
(Contract N00014-67-A-0126-0001)
(TR-3; AD-650310) CFSTI: HC $3.00/MF $0.65

The effects of stress, justification and timing of justification on liking for a dull task were investigated in a 2 X 2 X 2 factorial design. The results under low fear replicated an earlier study by Freedman: when justification was given before performing the task, the lower the justification, the greater the liking for the task; but when justification was given after completing the labor, the less the justification, the less the enjoyment of the task. Under high fear, no significant effects for either justification or timing of justification were found. However, high fear Ss found the task significantly more enjoyable than those under low fear, supporting a view that dissonance aroused by commitment to an unpleasant, forthcoming experience was reduced by positively evaluating the experimental task. Author (TAB)

N67-29159*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
BIOSCIENCE
In its Space Programs Sum. No. 37-44, Vol. IV 30 Apr. 1967 p 224-240 refs (See N67-29141 16-34)

Soil properties and abundance of microflora from soil profiles in the desert area of McKelvey Valley, Antarctica are presented. The methods of collecting and homogenizing the soil samples are outlined, along with the physical, physicochemical, chemical, and microbiological analytic techniques, and the data is tabulated. The conclusions include the following findings: The Antarctica soil properties are similar to those for other desert soils. All samples showed properties of a saline soil. Contamination with nonhuman organics could have occurred. Common groups of microflora was low or nil, and much lower than for typical United States desert soils. Mesophiles, microorganisms with psychrophilic capabilities, aerobes, anaerobes, and microaerophiles were present. Details are also given on the redesigning of a hydrogen ionization detector to monitor the products from a differential thermal analysis-effluent gas analysis thermal head assembly. N.E.N.

N67-29205*# International Information, Inc., Philadelphia, Pa.
SPACE BIOLOGY AND MEDICINE
Washington, NASA, Jun. 1967 134 p refs Transl. into ENGLISH of Kosmich. Biol. i Med. (Moscow), v. 1, no. 1, 1967 p 1-94
(Contract NASw-1499)
(NASA-TT-F-11100) CFSTI: HC $3.00/MF $0.65 CSCL 06S

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3. PROBLEMS OF GASTROENTEROLOGY IN SPACE MEDICINE AND THE PHYSIOLOGICAL BASES OF COSMONAUT NUTRITION I. M. Khazen p 13-22 refs (See N67-29208 16-04)

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8. NEURO REFLEX MECHANISMS CONTROLLING HEMODYNAMIC SHIFTS DURING RAPID AND SLOW INCREMENTS IN ACCELERATION Ye. B. Shul'zhenko p 55-59 refs (See N67-29213 16-04)

9. REACTION OF SOLITARY NEURONS IN THE VISUAL REGION OF THE CAT'S CEREBRAL CORTEX TO STIMULATION OF THE VESTIBULAR APPARATUS M. G. Kutateladze p 60-63 refs (See N67-29214 16-04)

10. SYNTHESIS OF TISSUE PROTEINS IN ANIMALS DURING HYPODYNAMIA I. V. Fedorov, V. N. Vinogradov, Yu. I. Milov, and L. A. Grishanina p 64-68 refs (See N67-29215 16-04)

11. PROBLEMS OF ACCELERATION IN SPACE PHYSIOLOGY A. S. Barer p 69-76 refs (See N67-29216 16-04)

12. RADIATION SAFETY OF MANNED SPACE FLIGHTS (RADIOBIOLOGICAL ASPECTS) Yu. G. Grigoriyev and Ye. Ye. Kovalev p 77–82 refs (See N67-29217 16-04)

13. APPLICATION OF ONBOARD COMPUTERS FOR MEDICAL MONITORING AND INVESTIGATIONS DURING MANNED SPACE FLIGHTS R. M. Bayevskiy p 83–90 refs (See N67-29218 16-05)

14. PROBLEMS OF SELECTING SCIENTIST-ASTRONAUTS P. I. Yegorov, G. P. Mikhaylovskiy, M. N. Korotayev, T. V. Benevolenskaya, N. M. Boglevskaya et al p 91–94 refs (See N67-29219 16-05)

15. PREVENTION OF THE ADVERSE EFFECT OF HYPOKINESIA ON THE HUMAN CARDIOVASCULAR SYSTEM P. V. Buyanov, A. V. Beregovkin, and N. V. Pisarenko p 95–100 refs (See N67-29220 16-04)

N67-29206*# International Information, Inc., Philadelphia, Pa.
SOME OF THE MAIN PROBLEMS OF SPACE BIOLOGY AND MEDICINE
N. N. Gurovskiy, V. V. Parin, and V. N. Pravetskiy *In its* Space Biol. and Med. Jun. 1967 p 1–4 (See N67-29205 16-04)

Some of the major problems encountered in the development of space biology and medicine are outlined. Physiological and psychological aspects of spacecraft crews and habitable environments are discussed in detail. Author

N67-29207*# International Information, Inc., Philadelphia, Pa.
EXPERIMENTAL RESEARCH INTO SPACE PSYCHOLOGY
V. V. Parin and F. D. Gorbov *In its* Space Biol. and Med. Jun. 1967 p 5–12 refs Presented at the 18th Intern. Congr. of Psychologists, Moscow, Aug. 1966 (See N67-29205 16-04)

The authors emphasize the significance of space psychology as an independent branch of science. Historically, they distinguish two stages: the one prior to, and the other following, the first manned space mission. The paper describes tasks involved in astronaut training. It contains the results of investigations performed using different techniques, including methods of group psychology research. Particular importance is attached to clinical models, i.e., diseases which are, to a certain extent, similar to syndromes developing under extreme conditions. Flight studies involve an analysis of the performance and the application of uncomplicated tests. Post-flight investigations combine pre- and inflight research findings. In this connection, new research purposes are mentioned. Author

N67-29208*# International Information, Inc., Philadelphia, Pa.
PROBLEMS OF GASTROENTEROLOGY IN SPACE MEDICINE AND THE PHYSIOLOGICAL BASES OF COSMONAUT NUTRITION
I. M. Khazen *In its* Space Biol. and Med. Jun. 1967 p 13–22 refs (See N67-29205 16-04)

The author reviews the literature and his own findings on physiology and pathology of the gastrointestinal tract in response to stress exposures. Three problems which are of theoretical and practical significance are indicated: (1) effects of space flight factors on the function of the digestive system; (2) role of the digestive system in the development of motion symptoms during space flight; and (3) development of physiological requirements in relation to long duration space missions. Repeated exposures of the human organism to accelerations, hypoxia, and other factors regularly applied following their after-effects result in its pronounced adaptation. The author discusses techniques to prevent digestive disturbances and to maintain homeostatic functions of the human body. Author

N67-29209*# International Information, Inc., Philadelphia, Pa
PROBLEMS OF CREATING LIFE SUPPORT SYSTEMS FOR SPACECRAFT
B. A. Adamovich and G. G. Ter-Minas'yan *In its* Space Biol. and Med. Jun. 1967 p 23–33 refs (See N67-29205 16-04)

A discussion is presented on the main problems related to life-support systems for spacecraft. Their quality will determine the health and performance of the crew and, consequently, the fulfillment of the mission. Some advanced life-support systems are outlined and approaches in current research that may help to solve the problems are presented. It is shown that these problems can be solved on the basis of the combined efforts of specialists in medicine, biology, chemistry, and engineering. Author

N67-29210*# International Information, Inc., Philadelphia, Pa.
THE PROBLEM OF SPACECRAFT HABITABILITY
Yu. G. Nefedov and S. N. Zaloguyev *In its* Space Biol. and Med. Jun. 1967 p 34–42 refs (See N67-29205 16-04)

A formula is proposed for estimating the composition of the atmosphere in an enclosed space. Studies have indicated that the standards for maximum permissible levels of trace contaminants be based on maintaining a definite difference in the partial pressures of these contaminants in the exhaled air and the air of the sealed compartment. This will preclude accumulation of trace contaminants in the human body. Further studies should be concentrated on the biological compatibility of crew members in view of individual differences in human metabolism and microflora. Author

N67-29211*# International Information, Inc., Philadelphia, Pa.
INCREASING THE RADIORESISTANCE OF THE POTATO UNDER CONDITIONS OF ANOXIA
V. P. Dadykin, Yu. I. Shaydorov, D. F. Gertsuskiy, I. S. Skukina, T. I. Nikishanova et al *In its* Space Biol. and Med. Jun. 1967 p 43–48 refs (See N67-29205 16-04)

The paper presents a review of the literary data and the authors' findings relative to the utilization of the radioshielding effect of anoxia for plants growing in space greenhouses where they may be exposed to high doses of radiation. The results of experiments performed to study the radioshielding affect of anoxia, if any, when 1-mo-old potato seedlings were exposed to gamma rays are listed. When the doses were low (500 to 1500 rad) anoxia had little if any effect. Its radioshielding effect was very distinct when the doses were high (3000 to 5000 rad). The radioresistance of the potato plants was increased in the oxygen-free environment (nitrogen was substituted for oxygen). This was indicated by the increased potato yield from such plants. Author

N67-29212*# International Information, Inc., Philadelphia, Pa.
CHANGES IN THE HEART DURING HYPOXIA (AN EXPERIMENTAL MORPHOLOGICAL STUDY)
V. V. Portugalov, O. G. Gazenko, V. B. Malkin, A. S. Kaplanskiy, G. N. Durnova et al *In its* Space Biol. and Med. Jun. 1967 p 49–54 refs (See N67-29205 16-04)

A 14 day experiment on mice kept in a pressure chamber at 378 mm Hg showed that acclimatization to hypoxia increased the resistance of the test animals to acute hypoxia and radial acceleration. The test animals exhibited distinct changes of the myocardium and valves. The data obtained indicate that the increase in specific and nonspecific resistance produced by adaptation to hypoxia is no basis for the assertion that hypoxia acclimatization has a favorable effect on the human body. Author

N67-29213*# International Information, Inc., Philadelphia, Pa.
NEURO REFLEX MECHANISMS CONTROLLING HEMODYNAMIC SHIFTS DURING RAPID AND SLOW INCREMENTS IN ACCELERATION
Ye. B. Shul'zhenko *In its* Space Biol. and Med. Jun. 1967 p 55–59 refs (See N67-29205 16-04)

Anesthetized dogs were exposed to transverse (chest-to-back) accelerations of 9 G for 1 min. They were studied for hemodynamic changes in the cases of intact and denervated zones of the carotid sinus. It is concluded that slowly increasing accelerations play an important role in the development of adaptive and compensatory reactions and are of significance for the body tolerance to accelerations. Author

N67-29214*# International Information, Inc., Philadelphia, Pa.
REACTION OF SOLITARY NEURONS IN THE VISUAL REGION OF THE CAT'S CEREBRAL CORTEX TO STIMULATION OF THE VESTIBULAR APPARATUS
M. G. Kutateladze *In its* Space Biol. and Med. Jun. 1967 p 60–63 refs (See N67-29205 16-04)

Effects of vestibular excitation (exposure to 0.1 to 2 G) on the activity of the neurons of the optic cortex were studied in cats. The microelectric technique was used to monitor the neurons. The results obtained were processed by correlation analysis. Despite the change in the frequency characteristics of the neuron pulse activity, no correlation was found between the changes in neuron activity and the changes in acceleration values. This suggests that excitation of the vestibular apparatus produces a nonspecific effect on the optic cortex. Author

N67-29215*# International Information, Inc., Philadelphia, Pa.
SYNTHESIS OF TISSUE PROTEINS IN ANIMALS DURING HYPODYNAMIA
I. V. Fedorov, V. N. Vinogradov, Yu. I. Milov, and L. A. Grishanina *In its* Space Biol. and Med. Jun. 1967 p 64–68 refs (See N67-29205 16-04)

A 10 to 15 day exposure of rats to hypodynamic caused a significant decrease in the rate of protein synthesis in their liver, kidneys, intestinal walls, heart, and skeletal muscles. The rate had not returned to its initial values by the 6th day after the 15-day exposure to hypodynamia. By this time, normalization of the peripheral blood picture had likewise not commenced, nor had the glycogen level in the liver or weight of the adrenals begun to normalize. Author

N67-29216*# International Information, Inc., Philadelphia, Pa.
PROBLEMS OF ACCELERATION IN SPACE PHYSIOLOGY
A. S. Barer *In its* Space Biol. and Med. Jun. 1967 p 69–76 refs (See N67-29205 16-04)

On the basis of data in the literature and his own findings, the author discusses biomedical problems related to the evaluation of human tolerance to accelerations and the development of methods to increase it. An evaluation is made of the primary factors which limit human tolerance to acceleration. In this connection, the significance of oxygen metabolism in vital organs is emphasized. It is shown that tolerance to impact acceleration depends on the strength of different organs and tissues rather than on the pattern of their physiological responses. Author

N67-29217*# International Information, Inc., Philadelphia, Pa.
RADIATION SAFETY OF MANNED SPACE FLIGHTS (RADIOBIOLOGICAL ASPECTS)
Yu. G. Grigoriyev and Ye. Ye Kovalev *In its* Space Biol. and Med. Jun. 1967 p 77–82 refs (See N67-29205 16-04)

Safety criteria with regard to crew irradiation on short and long-term space flights are considered. It is important to evaluate the recovery process after repeated exposure to radiation, to determine the degree of radiation damage during flight, and to develop methods of preliminary estimation of the astronaut's radiosensitivity. When evaluating radiation hazards of prolonged space flights, it is of great significance to estimate the radiosensitivity of biological life-support systems. The data on the effects of 126 to 660 MeV protons on some higher plants are presented. Author

N67-29218*# International Information, Inc., Philadelphia, Pa.
APPLICATION OF ONBOARD COMPUTERS FOR MEDICAL MONITORING AND INVESTIGATIONS DURING MANNED SPACE FLIGHTS
R. M. Bayevskiy *In its* Space Biol. and Med. Jun. 1967 p 83–90 refs (See N67-29205 16-04)

The principles of developing diagnostic algorithms as applied to onboard computers are considered. Data on the necessary frequency of quantization of some physiological parameters to be fed into the digital computer are presented. Possibilities of machine analysis and logical evaluation of biomedical information are discussed. It is proved that deterministic algorithms can be applied to develop programs for automatic medical monitoring. Some other types of algorithms, e.g., probabilistic, scanning, self-learning, etc., are described. The procedure of programmed biomedical studies involving the onboard digital computer is shown. It is emphasized that the application of algorithm and programming techniques to solve diagnostic problems is of great importance for the development of efficient onboard systems of automatic biomedical monitoring and investigations. Author

N67-29219*# International Information, Inc., Philadelphia, Pa.
PROBLEMS OF SELECTING SCIENTIST–ASTRONAUTS
P. I. Yegorov, G. P. Mikhaylovskiy, M. N. Korotayev, T. V. Benevolenskaya, N. M. Boglevskaya et al *In its* Space Biol. and Med. Jun. 1967 p 91–94 refs (See N67-29205 16-04)

The present stage of development of astronautics necessitates the active participation of highly qualified scientists in space missions. In this connection, space medicine encounters a new problem—to develop scientific criteria for selecting scientist–astronauts. This problem involves a study of the age of candidates and their physical fitness. This article emphasizes the significance of the multi-faceted examinations using functional tests to elicit both latent pathology and functional limitations of the human body. The paper indicates the importance of establishing a correlation between the state of the central nervous system and functional abilities of the organism during functional tests, as well as the correlation between vestibular stability, optic sensitivity, and the state of the autonomic nervous system. Author

N67-29220*# International Information, Inc., Philadelphia, Pa.
PREVENTION OF THE ADVERSE EFFECT OF HYPOKINESIA ON THE HUMAN CARDIOVASCULAR SYSTEM
P. V. Buyanov, A. V. Beregovkin, and N. V. Pisarenko *In its* Space Biol. and Med. Jun. 1967 p 95–100 refs (See N67-29205 16-04)

Prevention of the adverse effect of the hypokinesia inherent in prolonged space missions on the human cardiovascular system is discussed. On the basis of the literature and their own data, the authors prove the effectiveness of procedures for maintaining good physical fitness at a sufficient functional level of the circulatory system. The procedures involve adequate physical training and rhythmic compression of the limbs. The use of pharmacological agents and moderate hypoxia for the same purpose requires further investigation. Author

N67-29227# School of Aerospace Medicine, Brooks AFB, Tex.
INITIAL OBSERVATIONS ON THE EFFECT OF HYPOBARIC AND HYPERBARIC PRESSURE ON CELL PERMEABILITY, MAY–AUGUST 1966
Albert T. Bernardini and William H. Pryor, Jr. Dec. 1966 10 p refs
(SAM-TR-66-108; AD-648711) CFSTI: HC $3.00/MF $0.65

Observations of the behavior of human red blood cells in osmotic fragility tests carried out under increased or decreased atmospheric pressures resulted in an apparent alteration in the mechanics of solvent exchange or cell permeability, or both. Comparison of the relative hemolysis of human erythrocytes in hypotonic saline at hypobaric and hyperbaric pressures showed an increase and decrease, respectively, in the extent of hemolysis when compared to ground-level controls. Observations showed that a shift of the normal range curve of osmotic fragility for individuals occurred relative to atmospheric pressure changes. Mechanisms involved in hemolytic changes due to ambient pressure changes have not been fully explored, but changes seen are coincidental with, and relative to, increased or decreased atmospheric pressure variations. It is suggested that since erythrocyte permeability has apparently been altered in vitro, similar alterations may be occurring

in vivo, initiated by hydrostatic pressure variations. Problem areas for investigation prompted by these assumptions may involve changes in body fluid shifts, drug dosage and assimilation, and other physiologic and pharmacologic aspects for re-evaluation under conditions of altitude or depth. Author (TAB)

N67-29241*# National Aeronautics and Space Administration, Washington, D. C.

THE EFFECT OF SPACE-FLIGHT FACTORS ON FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM

N. N. Livshits, ed. Jun. 1967 305 p refs Transl. into ENGLISH from the book "Vliyaniye Faktorov Kosmicheskogo Poleta na Funktsii Tsentral'noy Nervnoy Sistemy" Moscow, Izd. Nauka, 1966 (NASA-TT-F-413) CFSTI: $3.00 CSCL 06S

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3. FUNCTIONAL STATE OF THE OTOLITHIC PART OF THE VESTIBULAR ANALYZER OF GUINEA PIGS AFTER DOUBLE EXPOSURE TO CENTRIFUGATION Z. I. Apanasenko p 21–39 refs (See N67-29244 16-04)

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5. EFFECT OF VERTICAL VIBRATION AND NOISE ON THE CONDITIONED REFLEXES OF RATS N. N. Livshits and Ye. S. Meyzerov p 61–74 refs (See N67-29246 16-04)

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9. RESPIRATORY CHANGE DURING VIBRATION Ye. P. Kazanskaya and L. D. Luk'yanova p 118–121 refs (N67-29250 16-04)

10. EFFECT OF ACUTE X-IRRADIATION ON VENOUS CIRCULATION IN THE CEREBRAL VESSELS OF A RABBIT V. Ya. Klimovitskiy p 122–129 refs (See N67-29251 16-04)

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16. COMBINED EFFECT OF DOUBLE EXPOSURE TO VIBRATION AND CHRONIC IRRADIATION ON THE FUNCTIONAL STATE OF THE VESTIBULAR APPARATUS Z. I. Apanasenko p 212–228 refs (See N67-29257 16-04)

17. COMBINED EFFECT OF VIBRATION AND IONIZING RADIATIONS ON THE CONDITIONED REFLEXES OF RATS N. N. Livshits and Ye. S. Meyzerov p 229–243 refs (See N67-29258 16-04)

N67-29242*# National Aeronautics and Space Administration, Washington, D. C.

SOME PROBLEMS OF THE EFFECTS OF SPACE-FLIGHT FACTORS ON THE CENTRAL NERVOUS SYSTEM

N. N. Livshits *In its* The Effect of Space-Flight Factors on Functions of the Central Nervous System Jun. 1967 p 1–7 (See N67-29241 16-04)

Experimental investigations are reviewed on the effects of vibration, acceleration, and ionizing radiation on the central nervous system and cerebral hemodynamics. Studies of the quantitative patterns and mechanisms of the reactions of the nervous system to repeated vibrational exposures are considered; as are those which concern conditioned reflexes, bioelectric activity of the brain, and metabolic processes. The study of the after-effect period following vibration is noted in this regard. An overview is also presented of the effect of ionizing radiations and dynamic factors in developing radiation safety measures for space flights. Different dose rates, change in radiation spectrum, and combined effects of radiation and other factors are reviewed in terms of changing central nervous system functions. M.W.R.

N67-29243*# National Aeronautics and Space Administration, Washington, D. C.

EFFECT OF RADIAL ACCELERATIONS ON THE BRAIN TEMPERATURE OF ANIMALS

V. Ya. Klimovitskiy *In its* The Effect of Space-Flight Factors on Functions of the Central Nervous System Jun. 1967 p 8–20 refs (See N67-29241 16-04)

Temperature under the dura mater was recorded in one dog and six rabbits exposed to radial accelerations on a centrifuge. Temperatures were measured with thermistors to within $3.0 \cdot 10^{-3}$ degrees, and the animals were exposed to repeated daily accelerations of 10 g for 30 sec with 30-min intervals. In rabbits, longitudinal accelerations caused an acute decrease in temperature with an immediate return to normal after stopping. In the dog, the analogous temperature peak was directed upward. After repeated exposures the degree of the reaction first increased and then decreased. This phenomenon can be interpreted as initial adaptation. During transverse accelerations there was a temperature increase of small variability in the dog and rabbit. In most cases, after the end of rotation there was a slow decrease of temperature with a return to normal after 15–20 min. The observed temperature changes are compared with those induced by an increase of inhaled carbon dioxide and with data on cerebral circulation under the same conditions. Author

N67-29244*# National Aeronautics and Space Administration, Washington, D. C.

FUNCTIONAL STATE OF THE OTOLITHIC PART OF THE VESTIBULAR ANALYZER OF GUINEA PIGS AFTER DOUBLE EXPOSURE TO CENTRIFUGATION

Z. I. Apanasenko *In its* The Effect of Space-Flight Factors on Functions of the Central Nervous System Jun. 1967 p 21–39 refs (See N67-29241 16-04)

The effect of double exposure to acceleration (chest and back, 8 g, 15 min, one day interval) on the functional state of the otolithic apparatus of the guinea pig was investigated. Changes in some myoelectric characteristics of vestibular-tonic hind leg reflexes were of a shorter duration and, in some cases, of a lesser magnitude than those after vibration with similar parameters. The condition of the experimental animals revealed no departure from normal, but analysis of the peripheral blood disclosed insignificant leukocytosis. The effects of space flight, acceleration, and vibration are compared with respect to indexes of the vestibular-tonic reflex. In some cases the effects of space flight reveal vibration and acceleration effects, although they were not fully reproducible. Author

N67-29245*# National Aeronautics and Space Administration, Washington, D. C.

EFFECT OF MULTIPLE EXPOSURE TO VIBRATION ON THE FUNCTIONAL STATE OF THE SPINAL REFLEX ARC

M. A. Kuznetsova *In its* The Effect of Space-Flight Factors on Functions of the Central Nervous System Jun. 1967 p 40–60 refs (See N67-29241 16-04)

Guinea pigs exposed to whole-body vertical vibration 10 times in the course of 16 days (70 cps, 0.4 mm, 15 min) exhibited parabiotic phenomena in the defensive flexor reflex arc. An inverse correlation was noted between changes in latent period duration and changes in the intensity of threshold electrical stimulus. In the first part of the period of exposure to vibration, there was a cumulation of vibration effects. In the second part, reflex activity tended to improve. A succession of parabiotic phases takes place in the reflex arc, which is indicative of a transfer from higher to lower inhibition. This phenomenon is thought to be evidence of incomplete adaptation to vibration. Vibration stand noise caused changes in the reflexes of the control animals, but these changes differed greatly from those in the experimental animals. Author

N67-29246*# National Aeronautics and Space Administration, Washington, D. C.

EFFECT OF VERTICAL VIBRATION AND NOISE ON THE CONDITIONED REFLEXES OF RATS

N. N. Livshits and Ye. S. Meyzerov *In its* The Effect of Space-Flight Factors on Functions of the Central Nervous System Jun. 1967 p 61–74 refs (See N67-29241 16-04)

Rats were exposed three times to whole-body vertical vibration (70 cps, 0.4 mm, 15 min). The interval between the first and second exposures was 14 days, and between the second and third exposures was 7 days. The control animals were placed near the operating vibration stand at the time the experimental rats were subjected to vibration. The motor alimentary reflexes of both sets of the rats were investigated. In rats with a high initial level of conditioned reflexes vibration caused inhibition, with disruption of the relationship between the level of the conditioned reflexes and the stimulating factor. There were significant individual differences in the responses of higher nervous activity to vibration. In some animals the conditioned reflexes disappeared entirely under the influence of vibration, whereas in others a decrease was noted. In rats with low initial level of conditioned reflexes vibration caused an increase in the conditioned reflexes, disinhibition of differentiation, and phase phenomena. In the control animals subjected to vibration stand noise the changes in conditioned reflexes were considerably less clearly expressed than in the experimental animals. Author

N67-29247*# National Aeronautics and Space Administration, Washington, D. C.

THE FUNCTIONAL SIGNIFICANCE OF CHANGES IN THE BIOELECTRIC ACTIVITY OF THE BRAIN AND ITS OXIDATING CAPACITY DURING VIBRATION

L. D. Luk'yanova and Ye. P. Kazanskaya *In its* The Effect of Space-Flight Factors on Functions of the Central Nervous System Jun. 1967 p 75–87 refs (See N67-29241 16-04)

Exposure to whole-body vertical vibration (70 cps, 0.4 mm, 15 min) caused the appearance of a stable locus of excitation in higher regions of the central nervous system of rats, accompanied by increased oxygen consumption and hypersynchronization of low frequency oscillations in the EEG. The phase of generalized excitation and the subsequent concentration of the excitation process are observed in the sensorimotor and visual regions of the cerebral cortex. The compensatory-adaptative mechanisms contributing to the decrease in sensitivity to vibration occur in connection with a decrease in excitation processes. Author

N67-29248*# National Aeronautics and Space Administration, Washington, D. C.

EFFECT OF VIBRATION STIMULUS ON THE OXYGEN METABOLISM OF THE BRAIN IN ANIMALS WITH PARTIALLY ELIMINATED AUDITORY AND VESTIBULAR SYSTEMS

L. D. Luk'yanova and S. M. Ambrosova *In its* The Effect of Space-Flight Factors on Functions of the Central Nervous System Jun. 1967 p 88–98 refs (See N67-29241 16-04)

Rats were exposed to repeated whole-body vertical vibration, and oxygen consumption in different parts of the brain was studied. Partial destruction of the vestibular apparatus contributed to the appearance of compensatory-adaptation effects on the indices, without a decrease in the general functional level of the CNS. In experiments on anesthesized animals, direct proof was obtained of the extremely important role of the vestibular apparatus in the perception of vibration. Author

N67-29249*# National Aeronautics and Space Administration, Washington, D. C.

INVESTIGATION OF THE RELATIONSHIP BETWEEN THE OXYGEN METABOLISM OF THE BRAIN, ITS ELECTRICAL ACTIVITY AND THE CONDITIONED REFLEX ACTIVITY OF ANIMALS AFTER VIBRATION

L. D. Luk'yanova, A. V. Kol'tsova, Ye. S. Meyzerov, and Ye. P. Kazanskaya *In its* The Effect of Space-Flight Factors on Functions of the Central Nervous System Jun. 1967 p 99–117 refs (See N67-29241 16-04)

When rats were exposed to whole-body vertical vibration six times a week, changes in different indices of the functional state of the central nervous system had a phase character. A study was made of oxygen consumption in cerebral tissues, total bioelectric activity, very slow oscillations and conditioned reflex activity. The first period (1st–4th vibrations) was characterized by the appearance of postvibration generalized inhibition in the higher parts of the brain. In the second period (after the 4th vibration) a compensatory-adaptative process developed, contributing to relative normalization of functions. The third period (after the 20th–25th vibrations) was characterized by a total decrease in the functional activity of higher parts of the CNS. Author

N67-29250*# National Aeronautics and Space Administration, Washington, D. C.

RESPIRATORY CHANGE DURING VIBRATION

Ye. P. Kazanskaya and L. D. Luk'yanova *In its* The Effect of Space-Flight Factors on Functions of the Central Nervous System Jun. 1967 p 118–121 refs (See N67-29241 16-04)

External respiration was measured in rats exposed to whole-body vertical vibration at a frequency of 70 cps, amplitude of 0.4 mm, and for an exposure time of 15 min. In the first half of the vibration time there was increase in respiration frequency. No general tendency in responsive reaction could be detected in the second half of the vibration period or in the post-vibration period. It is concluded that the changes in oxygen metabolism induced by vibration are not related to respiratory changes. Author

N67-29251*# National Aeronautics and Space Administration, Washington, D. C.

EFFECT OF ACUTE X-IRRADIATION OF VENOUS CIRCULATION IN THE CEREBRAL VESSELS OF A RABBIT

V. Ya. Klimovitskiy *In its* The Effect of Space-Flight Factors on Functions of the Central Nervous System Jun. 1967 p 122–129 refs (See N67-29241 16-04)

Cerebral venous blood flow was measured using thermistors for study of the cerebral surface veins of rabbits exposed to X-irradiation. In one group of animals the back and abdomen were irradiated by a dose of 2000 r. Other animals were exposed to total irradiation of 1000 r. In both cases a decrease in the level of cerebral blood flow was observed in the irradiated rabbits compared to control during the first hours after irradiation. Locally irradiated animals were observed for 6 to 8 hours. Whole-body irradiated rabbits survived after exposure and were observed until their death from radiation sickness. In these animals a second decrease of cerebral blood flow was observed 1 to 2 days prior to death. The data obtained are discussed in relation to the literature concerning the effect of irradiation on general and cerebral hemodynamics. Author

N67-29252*# National Aeronautics and Space Administration, Washington, D. C.

CHARACTERISTICS OF EFFECT OF DIFFERENT TYPES OF RADIATION ON THE HIGHER NERVOUS ACTIVITY OF SMALL ANIMALS, I

A. P. Korolevskiy *In its* The Effect of Space-Flight Factors on Functions of the Central Nervous System Jun. 1967 p 130–145 refs (See N67-29241 16-04)

The comparative effect of fast neutrons, 510 MeV protons, and gamma irradiation in a dose of 300 rad on the higher nervous activity of mice of the SS_{57}(B1) strain was investigated by the motor drinking conditioned reflex method. Exposure to these types of radiation induced disturbance of both excitation and inhibition processes. Neutron and gamma radiations led to more severe disruption of the excitation process, whereas proton radiation more seriously affected the inhibition process. With respect to effectiveness, the three types of radiation fall on the following scale: neutron > gamma radiation > protons. A parallelism was established between the dependence of disruption of conditioned reflex activity on linear ionization density, and the changes in the indices of the peripheral blood are described. Author

N67-29253*# National Aeronautics and Space Administration, Washington, D. C.

CHARACTERISTICS OF EFFECT OF DIFFERENT TYPES OF RADIATION ON THE HIGHER NERVOUS ACTIVITY OF SMALL ANIMALS, II

A. P. Korolevskiy *In its* The Effect of Space-Flight Factors on Functions of the Central Nervous System Jun. 1967 p 146–157 refs (See N67-29241 16-04)

A study was made of the comparative effect of fast neutrons and gamma irradiation (Co^{60}) in a dose of 25 rad on the higher nervous activity of mice by using the conditioned reflex drinking method. Acute whole-body neutron and gamma irradiations induced weakening of the processes of inhibition and stimulation. Weakening of the processes of active inhibition and stimulation in mice exposed to neutron irradiation was expressed more clearly than in animals exposed to gamma irradiation. It was found that there is a parallelism between disruptions of conditioned reflex activity, depending on linear ionization density; and changes in the hematological indexes were observed. Author

N67-29254*# National Aeronautics and Space Administration, Washington, D. C.

CHARACTERISTICS OF EFFECT OF DIFFERENT TYPES OF RADIATION ON THE HIGHER NERVOUS ACTIVITY OF SMALL ANIMALS, III

A. P. Korolevskiy *In its* The Effect of Space-Flight Factors on Functions of the Central Nervous System Jun. 1967 p 158–174 refs (See N67-29241 16-04)

Comparative effects of fast neutrons, 510 MeV protons, and gamma radiations in doses of 150 rad on the higher nervous activity of "August" rats were studied by the motor drinking conditioned reflex method. Disturbances of excitation and inhibition processes were detected in all irradiated animals. Neutron and gamma irradiations resulted in greatest disruption of the excitation process, whereas proton irradiation caused greatest disruption of the inhibition process. Author

N67-29255*# National Aeronautics and Space Administration, Washington, D. C.

COMPARISON OF THE EFFECT OF WHOLE-BODY CHRONIC AND ACUTE GAMMA IRRADIATION ON THE HIGHER NERVOUS ACTIVITY OF WHITE RATS (THE ROLE OF THE TIME FACTOR)

Ye. S. Meyzerov *In its* The Effect of Space-Flight Factors on Functions of the Central Nervous System Jun. 1967 p 175–191 refs (See N67-29241 16-04)

Two groups of rats were exposed to whole-body gamma irradiation by Co^{60} in a dose of 160 hr. One group was irradiated at a dose rate of 85 r/min and the other at the rate of 6 r/day. The conditioned motor alimentary reflexes and the cell content of the peripheral blood were studied. Acute and chronic irradiations caused similar changes in the conditioned reflexes. According to some data, the disturbances of higher nervous activity were somewhat more severe in rats exposed to chronic irradiation. The difference between the changes in these indices in the irradiated groups were not large, but these changes are considered statistically reliable. Contrary to the reactions of higher nervous activity, the decrease of leukocyte, erythrocyte, and hemoglobin content in the peripheral blood was more sharply expressed in animals exposed to acute irradiation. Author

N67-29256*# National Aeronautics and Space Administration, Washington, D. C.

EFFECT OF CHRONIC GAMMA IRRADIATION ON FUNCTIONS OF THE VESTIBULAR ANALYZER AND THE ROLE OF THE TIME FACTOR IN RADIATION REACTIONS OF THE NERVOUS SYSTEM

Z. I. Apanasenko *In its* The Effect of Space-Flight Factors on Functions of the Central Nervous System Jun. 1967 p 192–211 refs (See N67-29241 16-04)

Male guinea pigs were exposed to prolonged gamma irradiation with 500 r and a dose intensity of 0.6 r/min. The bioelectric activity of extensors of the rear extremity were investigated before, during, and after adequate stimulation of the vestibular analyzer. Survival rate, weight, and general clinical state of the animals were studied. Prolonged irradiation induces strong and long-term changes of the electromyographic characteristics of the vestibular-tonic reflex for the muscles of the rear extremity. These changes are greater and qualitatively different from those induced by acute irradiation in the same dose. All animals survived, and the severity of radiation sickness and the changes in the peripheral blood are less than after acute irradiation. Author

N67-29257*# National Aeronautics and Space Administration, Washington, D. C.

COMBINED EFFECT OF DOUBLE EXPOSURE TO VIBRATION AND CHRONIC IRRADIATION ON THE FUNCTIONAL STATE OF THE VESTIBULAR APPARATUS

Z. I. Apanasenko *In its* The Effect of Space-Flight Factors on Functions of the Central Nervous System Jun. 1967 p 212–228 refs (See N67-29241 16-04)

Guinea pigs were exposed to combined vibration, 15 min before and after irradiation, and prolonged gamma irradiation in a dose of 500 r and dose rate of 0.6 r/min. The bioelectric activity of the extensors of the rear extremities before, during, and after

adequate stimulation of the vestibular analyzer was studied. The survival rate, number of leukocytes in the peripheral blood, weight, and general clinical state of the animals were investigated. Vibration changes the radiation effects on the electromyographic characteristics of the vestibular-tonic reflexes. These changes were most significant during the first days after the exposure. However, the effects of prolonged irradiation are less affected by vibration than the similar effects of acute irradiation. The number of cells in the peripheral blood, weight dynamics, general clinical state, and survival rate of animals subjected to such combined exposure have no statistically significant difference from the corresponding parameters for prolonged irradiation alone. Author

N67-29258*# National Aeronautics and Space Administration, Washington, D. C.
COMBINED EFFECT OF VIBRATION AND IONIZING RADIATIONS ON THE CONDITIONED REFLEXES OF RATS
N. N. Livshits and Ye. S. Meyzerov *In its* The Effect of Space-Flight Factors on Functions of the Central Nervous System Jun. 1967 p 229–243 ref (See N67-29241 16-04)

Exposure of rats to vertical vibration or vibrostand noise, both followed by 50 rad X-irradiation, was compared with 15-min exposure to vibrostand noise by itself. The rats were exposed three times, with 14 days between the first and second exposures and 7 days between the second and third. In the first week after the combined vibration and X-ray exposure, the vibration effect dominated with respect to all indexes of conditioned motor alimentary reflexes; while in the second week after the first exposure, effects were produced by both vibration and radiation. After the second and third exposures, dominance of the vibration effect was noted by the change in the number of phase phenomena. These experiments show, on the one hand, that an extremely significant increase of conditioned reflexes is possible in the case of combined exposure; and, on the other hand, that the decrease in conditioned reflexes is more clearly expressed after combined exposure than after irradiation alone. M.W.R.

N67-29341# Advisory Group for Aeronautical Research and Development, Paris (France).
LOSS OF VISION FROM HIGH INTENSITY LIGHT
1966 202 p refs Presented at the Symp. on the Aerospace Med. Panel of AGARD-NATO, Paris, 16–17 Mar. 1966 *Its* AGARD Conf. Proc. No. 11

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N67-29342# School of Aerospace Medicine, Brooks AFB, Tex.
VISUAL DECREMENT IN HUMANS FOLLOWING THERMONUCLEAR DETONATIONS
James F. Culver *In* AGARD Loss of Vision from High Intensity Light 1966 p 23–38 refs Sponsored by DASA (See N67-29341 16-04)

Two men who received chorioretinal burns during Operation Fishbowl on Johnson Island were observed by physicians for 24 to 48 hours after exposure to the high altitude, long range, night-time missile-delivered nuclear detonation. Close observations were continued for more than 6 months following exposure from a point located at a slant range of over 30 nautical miles. Immediate visual disturbances were reported by both subjects, and the transient blinding cleared rather rapidly and left a central glowing positive scotoma followed by a small central negative scotoma. Ophthalmascopic examinations revealed generally similar lesions in both patients. In one patient, the tail-like extension of the scotoma disappeared within 2 weeks, and the central scotoma became slightly smaller after a period of 6 months. In the other case, the scotoma was absolute and central and increased slightly during the 6 months period. Vision was affected in both subjects; the fovea was apparently destroyed in one of the subjects, and his visual acuity upon discharge was 20/60 (6/18) bilaterally. The other patient, with 20/25 (6/7) bilaterally, was returned to duty. M.W.R.

N67-29343# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
WHAT IS THE FUNCTIONAL DAMAGE THRESHOLD FOR RETINAL BURN?
J. J. Vos, W. T. Ham, Jr., and W. J. Geeraets (Medical Coll. of Va., Richmond) *In* AGARD Loss of Vision from High Intensity Light 1966 p 39–53 refs (See N67-29341 16-04)

While the simplest method of determining the threshold irradiation dose for a retinal burn is to examine the fundus by opthalmoscopy, there is no guarantee that this threshold coincides with the functional threshold. A reduction of enzyme activity has been shown in the retina below the threshold for ophthalmoscopic or histologically detectable lesions. Interpretation of these data in terms of a quantitative model of enzyme destruction enables the determination of the sensitivity to temperature rise of retinal enzymes, and a closer approach to the problem of functional damage. Author

N67-29344# Zaret Foundation, Inc., Scarsdale, N. Y.
VISUAL AND RETINAL EFFECTS OF EXPOSURE TO HIGH INTENSITY LIGHT SOURCES
Milton M. Zaret and Gerard M. Grosof *In* AGARD Loss of Vision from High Intensity Light 1966 p 55–65 refs (See N67-29341 16-04)

Transient loss of visual function (flash blindness) and irreversible thermal injury of the retina are analyzed quantitatively. The measure selected for flash blindness was bleaching of a significant fraction of the visual pigments, and the criterion for retinal burn was the minimal lesion seen ophthalmoscopically. Threshold retinal radiant exposure as a function of wavelength was determined in each case. The computations showed that for some wavelengths, particularly those emitted by the usual laser sources, the retinal burn threshold may be greatly exceeded before marked "visual" impairment is produced. Author

N67-29345# London Univ. (England). Postgraduate Medical School.
IMMEDIATE AND DELAYED RETINAL VASCULAR CHANGES FOLLOWING EXPOSURE TO HIGH INTENSITY LIGHT
C. T. Dollery, E. M. Kohner, J. W. Paterson, and P. S. Ramalho *In* AGARD Loss of Vision from High Intensity Light 1966 p 67–72 refs (See N67-29341 16-04)

Exposure of the pig retina to intense unfocussed light from a xenon lamp produced immediate and delayed changes in the retina and its vascular bed. Long exposures (40–240 seconds) caused an immediate whitish discoloration of the retina, and fluorescence angiograms at this stage showed intense leakage from capillaries and small arterioles. Closure of the smaller vessels takes place in 30 to 60 minutes, but larger arteries and veins above about 60 μ diameter remained patent at this stage. After 1 to 3 days, hemorrhage occurred in the exposed area. Some larger arteries or veins became occluded, and all became tortuous and dilated. The intensity of these changes is variable and is usually more severe in animals with deeply pigmented retinas. Shorter exposures (20–40 seconds) caused no immediate change in the vessels apart from a few leaking points. Areas of whitish discoloration appeared after 1 to 3 days, and the larger vessels became dilated and tortuous. Regions of dilated capillaries appeared on angiograms. Exposures of less than 20 seconds caused no immediate or delayed damage. Histological observations indicated that patch retinal necrosis occurred in the retina exposed for long periods, but vascular changes occurred in areas where histological changes are confined to swelling and migration in the pigment layer. The vascular changes resemble in some respects those resulting from radiation in other tissues. Author

N67-29346# Ballistic Research Labs., Aberdeen Proving Ground, Md.
A STUDY OF EFFECTS OF LASER IRRADIATION ON HEAD AND EYE OF SMALL ANIMALS IN TERMS OF NEURO-MOTOR BEHAVIOR
William H. Kirby, Jr., John J. Kovaric (Army Dept.) and Larry M. Sturdivan *In* AGARD Loss of Vision from High Intensity Light 1966 p 77–87 refs (See N67-29341 16-04)

Dose, time, and response to focused laser energy to the eyes of mice, rats, and guinea pigs were considered in terms of mortality and effects on neuromotor activity. Results indicate that at the same dosage, blindness occurs if the laser energy is received by the eye and instant lethality results from exposure on top of the head. Very little neuromotor loss resulted from eye shots to white mice at energies as high as 125 joules, although there was complete loss of vision to the injured eye as well as considerable hemorrhage; and for white rats, there appeared to be no loss for energies to approximately 110 joules. For guinea pigs, the higher dosage had to be reached before activity loss resulted. A methodology is suggested for simulating serious eye and neuromotor effects to determine effects on animal performance. M.W.R.

N67-29347# Kansas State Univ., Manhattan.
THE TIME COURSE OF FLASH BLINDNESS
John Lott Brown *In* AGARD Loss of Vision from High Intensity Light 1966 p 91–107 refs (See N67-29341 16-04)

Laboratory studies investigate the effects of flash luminosity, duration, and spectral character; visual acuity requirements of the task to be performed; illumination provided; and relative positions of the retinal images of the task and the flash. By measuring elapsed time between exposure and satisfactory task performance, it is found that illumination of the task is the most significant variable in most cases. By increasing task luminosity, recovery time can be reduced to two or three seconds for flash exposures that do not cause retinal damage. While flash blindness conditions studied in the laboratory may be highly artificial, such experiments do indicate the functional relationship among the relevant variables. Values of recovery times reported in laboratory studies should, therefore, not be considered as having absolute application to field situations; in fact, it has been suggested that recovery in the field may occur faster than in the laboratory, possibly because simulated studies emphasize the worst possible conditions. M.W.R.

N67-29348# Royal Aircraft Establishment, Farnborough (England). Inst. of Aviation Medicine.
EFFECTS OF SIMULATED RETINAL BURNS ON DETECTABILITY AND LEGIBILITY
V. D. Hopkin and T. C. D. Whiteside *In* AGARD Loss of Vision from High Intensity Light 1966 p 109–120 refs (See N67-29341 16-04)

Blind areas in the visual field of human subjects were simulated by use of the afterimage of an intense light source. Ability to perform a legibility task such as reading digits was greatly affected by the size of the blinded area, and by whether it was located in the fovea or the near periphery. Performance of a detectability (search) task was also degraded when there was an experimental blind area in the visual field, but the effects were smaller and related less closely to the size and position of the area. Differences between subjects were large. Author

N67-29349# Toronto Univ. (Ontario). Banting Inst.
PRESERVING VISION DESPITE EXPOSURE TO HIGH INTENSITY LIGHT
Clement McCulloch and John R. Elder *In* AGARD Loss of Vision from High Intensity Light 1966 p 121–142 refs (See N67-29341 16-04)

Preliminary experiments suggest that shading of areas of the retina, particularly the macular region, can provide considerable protection from glare. In fact, in combination with proper engineering of the task to be performed, shading of part of the retina can permit continuous and efficient performance both before and after exposure to bright light. Results presented for light levels in the region of 5,000 foot lamberts indicate protection of central vision when (1) an area 5° to each side of fixation was shaded from the dazzling light and (2) the dazzling light was eccentrically placed to clear the fixation point by 5°. When the dazzling light was obliquely placed, before one side of the retina only, recovery was slower on that side than on the unexposed side. M.W.R.

N67-29350# Biotechnology, Inc., Arlington, Va.
THE SUCCESS OF US NAVY EQUIPMENT DEVELOPMENT PROGRAMS IN MEETING THE FLASH BLINDNESS PROBLEM
James F. Parker, Jr. and Roland A. Bosee (Bureau of Naval Weapons) *In* AGARD Loss of Vision from High Intensity Light 1966 p 143–158 refs (See N67-29341 16-04)

Efforts by the United States Navy to combat the flash blindness problem are reviewed from an historical viewpoint. Initial efforts were with fixed density visors to attenuate light so as to prevent retinal burns and reduce the severity of flash blindness. Another early project was aimed at providing protection from the

thermal effects of a weapon. A low transmission gold-coated visor system, which is considered adequate for daytime protection, is described; and attention is given to current efforts to produce a satisfactory device for protection at night. The comprehensive training program for disseminating information about flash blindness and proper use of protective equipment is discussed. M.W.R.

N67-29351# Centre de Recherches des Arimees, Paris (France).
PHOTOCHROMIC SUBSTANCES
P. J. Douzou *In* AGARD Loss of Vision from High Intensity Light 1966 p 159–163 (See N67-29341 16-04)

Highlights are presented of the use of photochromic substances as protective agents against dazzle, and some of the problems associated with the excitation of light are noted. It is noted that the electronic and molecular mechanisms acting in photochromism are complex, and that the medium plays a very important role in the intramolecular reaction. Secondary bimolecular or trimolecular reactions giving rise to free radicals and chain reactions are always observed during photochromism. The photochromic substances considered in the present discussion were derived from the family of spiropyrans. M.W.R.

N67-29352# Institute for Perception RVO–TNO, Soesterberg (Netherlands).
THE RELATIVE DANGER OF RETINAL BURN AND FLASH BLINDNESS FOR VARIOUS YIELDS OF NUCLEAR EXPLOSIONS
J. J. Vos *In* AGARD Loss of Vision from High Intensity Light 1966 p 171–202 refs (See N67-29341 16-04)

Explosions of 3 kT are considered the most dangerous in terms of hazards to vision, although such dangerous explosions will probably not produce retinal burns or overall flash blindness during the daytime. At night, however, an explosion of 3 kT can be expected to produce both the burn and the flash blindness; although the effects will not take place until 10 msec after the explosion. Two adequate means of protecting pilots against night-time explosions exist, and the best protection is offered by automatically closing devices such as electromechanical goggles or phototropic materials. Adequate protection is offered by phototropic glasses which close within 10 msec to density 2, as long as the fireball is not seen with the central vision. Protection from this local flash blindness requires considerably more sophisticated techniques, but such efforts are not considered worthwhile because, even in the case of a dead ahead explosion, parafoveal vision can control the aircraft in an emergency. M.W.R.

N67-29353# School of Aerospace Medicine, Brooks AFB, Tex.
PREDICTION OF EYE SAFE SEPARATION DISTANCES
Everett O. Richey *In* AGARD Loss of Vision from High Intensity Light 1966 p 203–224 refs (See N67-29341 16-04)

A method, for predicting the distances at which the thermal radiation from nuclear detonations will be hazardous to the unprotected human eye, relates calculated retinal exposure to experimentally determined eye effects data. Graphs are used to show experimental laboratory data on animals relating minimal retinal burns and flash blindness duration to retinal exposures. Eye hazards as a function of distance are determined for the unprotected human eye exposed to sea level, air-burst detonations from 0.01 to 1,000 kT yield. The pupil diameter of the human eye is taken to be 2.5 mm and 6.0 mm, respectively, for day and night conditions; and the effective focal length of the eye is taken to be 17 mm. Eye hazards as a function of distance are also determined for the human eye protected from daytime detonations by a 2% transmission fixed filter. Results indicate that such a filter provides eye protection at distances where other hazards become limiting factors. Author

N67-29354# Advisory Group for Aeronautical Research and Development, Paris (France).
RESISTANCE TO FLASH BLINDNESS AND AIRCREW SELECTION
A. Mercier and G. Perdriel *In its* Loss of Vision from High Intensity Light 1966 p 225–234 (See N67-29341 16-04)

Comberg's recording nyctometer was used to investigate the resistance of aircrew to dazzle. It was shown that the time lag for return to a useful visual acuity (5/10) after exposure to a flash does not change with the subject's age; and that normal recuperation takes place in 60% of the subjects, excellent recuperation in 30%, and insufficient recuperation in 10% of the cases. This poor dazzle resistance is characterized by a time lapse of 60 sec before reaching an acuity of 1/10, and an inability to reach more than 3/10 in 120 sec. It would, therefore, appear useful to introduce a test for visual recuperation time after dazzle into the aircrew selection physical examination. Preliminary results are included for 14 subjects tested for dazzle resistance before and after having taken five anthocyanoside tablets per day for five days. Five subjects showed a reduction in visual acuity, with prolongation of response time by 1 to 2 sec; 12 subjects demonstrated improved dazzle resistance with recovery time reduced 1 to 2 sec; and 14 subjects showed no change. M.W.R.

N67-29368*# Dunlap and Associates, Inc., Darien, Conn.
PERIPHERAL VISION DISPLAYS
Leroy L. Vallerie Washington, NASA, Jun. 1967 106 p refs
(Contract NAS12-88)
(NASA-CR-808) CFSTI: $3.00 CSCL 06B

Effectiveness of peripheral vision displays for presenting dynamic tracking information during difficult control tasks such as landing high-speed aircraft or rendezvousing spacecraft was studied. Based on a review of the literature, it was hypothesized that peripheral displays could be successfully used to improve performance provided visual switching between information sources is normally an essential part of such tasks. Visual switching consists of eye movement, accommodation, and convergence. The hypothesis was tested in the laboratory by comparing operator performance on a two-dimensional compensatory tracking task under conditions in which the requirements for visual switching and the provisions of peripheral displays were systematically varied and controlled. It was clearly demonstrated that tracking performance deteriorates as visual switching increases, and that peripheral displays can be used to overcome its adverse effects. Author

N67-29388*# Johns Hopkins Univ., Baltimore, Md.
STUDY OF EXTRAVEHICULAR PROTECTION AND OPERATIONS
P. Iribe and J. A. Lieske Washington, NASA, Jun. 1967 129 p refs
(Grant R-21-009-007; Contract NOw-62-0604-c)
(NASA-CR-773) CFSTI: HC $3.00/MF $0.65 CSCL 22A

A study is made of the requirements placed on extravehicular protection and operation devices by the orbital environment and contemplated oribital missions. The orbital missions studied cover the period 1970–1978 to the extent that they are presently defined. The conclusions favor a suited astronaut supported by propulsion, communication, and working aids (non-anthropomorphic suits were not included in this study). Concepts of vehicles satisfying the requirements developed are presented as is the concept of a modularly assembled device which can be modified to best suit specific mission requirements. Author

N67-29398*# Webb Associates, Yellow Springs, Ohio.
HUMAN WATER EXCHANGE IN SPACE SUITS AND CAPSULES
Paul Webb Washington, NASA, Jun. 1967 76 p
(Contract NASr-115)
(NASA-CR-804) CFSTI: HC $3.00/MF $0.65 CSCL 06S

This paper reviews the exchanges of water in normal man and considers the control of body water content. The following subjects are presented in some detail: insensible water loss from the skin and to the expired air; non-thermal, or psychogenic sweating; thermal sweating as influenced by metabolic level, environment, and other factors. The unexpected finding of weight loss in all manned flights, which is some 2–5% of body weight and is not affected by flight duration, may be a response to weightlessness causing a readjustment of body water. Medical problems considered are heat storage and heat exhaustion, dehydration and skin hygiene. Operational problems discussed include water supply, mild dehydration and environmental stress indices. Research is needed to clarify the mechanism of the weight loss of space flight and its effect on performance. A method of determining body mass should be developed. A specific thermal stress index is needed for space suit and space cabin use. We need better definitions of water requirements, and better definitions of the effects of mild dehydration. Author

N67-29412# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
EFFECTS OF BERYLLIUM SULFATE ON SERUM ALKALINE PHOSPHATASE IN PRIMATES Final Report, Jan.–Dec. 1964
Mildred K. Pinkerton and Ralph F. Ziegler Dec. 1966 14 p refs
(AMRL-TR-66-198; AD-650372) CFSTI: HC $3.00/MF $0.65

The effects of intratracheally administered beryllium sulfate on serum alkaline phosphatase were studied in male Macaca mulatta monkeys. Results showed 80% and 50% inhibition of the serum enzyme at 2 and 4 hours postinjection, respectively. Additional experiments were conducted using aluminum sulfate under identical conditions, and no inhibition of serum alkaline phosphatase was noted. Author (TAB)

N67-29420# Naval School of Aviation Medicine, Pensacola, Fla.
PREDICTING SUCCESS IN NAVAL FLIGHT OFFICER TRAINING
Floyd E. Peterson, Richard F. Booth, Norman E. Lane, and Rosalie K. Ambler 15 Feb. 1967 15 p ref
(NAMI-996; AD-650364) CFSTI: HC $3.00/MF $0.65

The purpose of this study was to develop a system for the prediction of success or failure in the Naval Flight Officer (NFO) program for use during basic NFO training. Two initial selection tests (an academic ability test and a mechanical comprehension test) plus two academic performance measures resulted in a multiple correlation coefficient of .45 with a dichotomous criterion of pass/attrite. Decision making regarding the retention of marginal students could be improved by use of the prediction formula generated in this study. Author (TAB)

N67-29430*# National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY—A CONTINUING BIBLIOGRAPHY WITH INDEXES, APRIL 1967
May 1967 158 p refs
(NASA-SP-7011(37)) CFSTI: HC $3.00/MF $0.65 CSCL 06S

The bibliography contains references announced during April 1967. It concentrates on biological, physiological, psychological, and environmental effects to man during atmospheric or space flights. Related topics are included such as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors. N.E.N.

N67-29451# Federal Fire Council, Washington, D. C.
CASE HISTORIES OF DEATHS AND INJURIES FROM CARBON TETRACHLORIDE FIRE EXTINGUISHERS
17 Apr. 1967 13 p refs
(AD-650734) CFSTI: HC $3.00/MF $0.65

The case histories represent incidents where the use of carbon tetrachloride as a fire extinguishing agent has resulted in injury and/or death. This compilation does not represent a complete literature search. There are a total of 16 deaths and 33 injuries from these 27 cases. Author (TAB)

N67-29452# George Washington Univ., Alexandria, Va. Human Resources Research Office.
THE UTILITY OF DATA FROM FIELD PERFORMANCE MEASUREMENT
A. James McKnight Mar. 1967 10 p refs Presented at the 10th Ann. Meeting of the Human Factors Soc., Anaheim, Calif., Nov. 1966 *Its* Profess. Paper 10–67
(Contract DA-44-188-ARO-2)
(AD-649866) CFSTI: HC $3.00/MF $0.65

In conducting field performance measurement, an estimate of individual or group performance is measured with respect to some larger system. Three general points at which researchers frequently fail to apply this measurement objective to the field measurement process are considered: First, in defining the tasks to be performed, the performance is often unwittingly changed so that it no longer conforms to the goals of the system. Secondly, the ability to obtain an estimate of field performance is frequently degraded by failure to maintain representative sampling in the selection or weighting of performance tasks. Finally, in selecting performance measures the observable system behavior is often abandoned in favor of some judgmental estimate of behavioral effectiveness. This not only leaves the relation of behavior to system goals unknown, but also limits the utility of the data with regard to other aspects of the same system or to other systems. Author (TAB)

N67-29485# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ON THE USE OF UNIVERSAL ELECTRONIC COMPUTERS FOR PROGRAMMED INSTRUCTION [OB ISPOL'ZOVANII UNIVERSAL'NYKH ELEKTRONNOVYCHISLITEL'NYKH MASIN DLYA PROGRAMMIROVANNOGO OBUCHENIYA]
V. G. Koryakov 17 Mar. 1967 26 p refs Transl. into ENGLISH from Programmirovannoye Obucheniye i Kiberneticheskiye Obuchayushchiye Machiny (USSR), 1963 p 139–159
(FTD-MT-65-202; TT-67-61650; AD-651035) CFSTI: HC $3.00/MF $0.65

A discussion is given of certain results of experimental application of digital computers to programmed learning and the principles of constructing teaching systems. Three models of the teaching process are presented: parallel, sequential, and branching. A block diagram is given for a training system using an electronic computer, and use of the 'Ural 1' machine with ST-35 instruments as inputs is discussed for teaching translation from German to Russian and design of radio receivers. Use of multipurpose computers (UMShN/Universalnaya Mashina Shirokogo Naznacheniya/) with automatic film viewers as output devices for study of radiotechnical circuits is described. TAB

N67-29487# North Star Research and Development Inst., Minneapolis, Minn.
EFFECTS OF PHYSIOLOGICAL RHYTHMS ON PERFORMANCE Final Report, 1966–1967
Guy H. Miles 28 Mar. 1967 88 p refs
(Contract AF 49(638)-1604)
(W-74; AFOSR-67-0857; AD-650321) CFSTI: HC $3.00/MF $0.65

A series of four studies was completed to determine the effect of time of day on learning and retention of skills. The four studies covered: (1) performance of well-learned skills; (2) learning and retention of simple perceptual-motor skills; (3) learning and retention of simple verbal skills; and (4) stimulus generalization. The results obtained were incorporated into the Hullian learning

theory framework. The results indicate that there is a 24-hour cycle of activation or arousal that has a general effect on learning and retention of skills; this effect is similar to the effect of the drive variable postulated by Hull. For subjects pursuing their usual daily routine, drive level is lowest in the early morning and increases until noon. Drive level declines in the early afternoon with recovery late in the afternoon, then rises until early evening. The effect of this 24-hour variation in drive level is particularly pronounced on conditioned autonomic responses; internal stimulus cues also change systematically on a 24-hour cycle. These cues make up a sufficient portion of the total stimulus to which responses are learned so that they affect the ability of the external stimulus components to elicit the learned response; the response tendency is different when tested at the same time of day that learning took place than when tested at other times of day. Author (TAB)

N67-29491# Sylvania Electric Products, Inc., Waltham, Mass.
AN INVESTIGATION OF HUMAN PROCESSING OF INFORMATION IN WEATHER FORECASTING Final Report, 15 May 1965–14 Nov. 1966
Donald B. Devoe Bedford, Mass., AFSC, Electron. Systems Div., 31 Jan. 1967 152 p refs
(Contract AF 19(628)-5176)
(ESD-TR-67-218; F-5151-1; AD-650918) CFSTI: HC $3.00/MF $0.65

As an approach to the analysis of human functions in complex systems, techniques were devised and tested for analyzing information processing by weather forecasters. The field interview as a source of information on the utilization of centrally-prepared aids to forecasting was evaluated at two Air Force weather stations. The presentation of weather information via a forecaster's console was simulated in the laboratory and tested experimentally both as a means for analyzing information processing by forecasters and as a test bed for evaluating new approaches to the display of weather information. The results of the interviews and the experiment are discussed regarding their implications for weather forecasting and for research methodology, and further studies are recommended. TAB

N67-29492# Army Medical Research Lab., Fort Knox, Ky. Experimental Psychology Div.
A SACCADIC SUPPRESSION EXPLANATION OF THE PULFRICH PHENOMENON
George S. Harker 28 Feb. 1967 13 p refs
(USAMRL-718; AD-648389) CFSTI: HC $3.00/MF $0.65

A latency explanation of the Pulfrich phenomenon of binocular vision provides for the seen path with an oscillating pendulum to be symmetrical and at right angles to the line of sight. Since the experience of asymmetries in the seen path of a pendulum, when viewed with one eye filtered, is more the rule than the exception, an explanation which has the potential to provide for both symmetry and asymmetry is to be preferred. A saccadic suppression explanation offers this possibility. A saccadic suppression explanation would provide that vision would be suppressed in the filtered eye first followed by suppression in the unfiltered eye. Both eyes would recover vision simultaneously. The predicted resultant disparate stimulation is consistent in direction with that necessary to the Pulfrich phenomenon. The details of the required stimulation have been checked using simple and compound episcotisters. The results with the episcotisters are consistent with the observed phenomena. Author (TAB)

N67-29493# School of Aerospace Medicine, Brooks AFB, Tex.
BIO-TELEMETRY PROBLEMS DURING PROLONGED SPACE MISSIONS [PROBLEMY BIOTELEMETRII V DLITEL'NYKH KOSMICHASKIKH POLETAKH]
I. T. Akulinichev, A. M. Zhdanov and I. I. Popov [1967] 14 p Transl. into ENGLISH of Russian Paper Presented at Intern Astronaut. Cong., Madrid, 9–15 Oct. 1966
(SAM-TT-R-814-1166; TT-67-61273; AD-648490) CFSTI: HC $3.00/MF $0.65

In the future, spacecraft will undergo structural changes (welding processes and partitioning or distribution of weight and equipment), and the crewmembers will perform more and more extravehicular activities; therefore, the medical control systems will also have to be changed accordingly. Radio communication channels and instruments will also have to conform with the different operational tasks. At present, short-range (on-board and near spacecraft) bio-telemetry systems present a relatively large number of problems. In fact, those involving important technical and experimental construction principles and some of the basic parameters have not been solved as yet. The report discusses the need for future theoretical and experimental research of radio waves propagation in solid, closed spaces and for the implementation of radio channels offering a highly reliable transmission of bio-telemetry data. Author (TAB)

N67-29500# Akron Univ., Ohio.
RATIONAL AND INTERACTIONAL DECISION-MAKING ROLES IN TASK-ORIENTED GROUPS
Norman F. Washburne and Cecil F. Darmofall [1967] 17 p refs
(Contract Nonr-4302(00))
(TR-4; AD-649824) CFSTI: HC $3.00/MF $0.65

As part of a long term effort to develop and verify a theory that cognitive styles differ according to differential socialization, and that they in turn affect role behavior in task-oriented decision-making groups, this study tested the hypothesis that strategists would tend to emerge as leaders in groups made up of both puzzle-solvers and strategists. The results tend to confirm the hypothesis. TAB

N67-29502# Institute for Research, State College, Pa. Div. of Psychobiology.
DRUG EFFECTS UPON A PERFORMANCE AS A FUNCTION OF DATA INPUT RATE
Paul M. Hurst, Kenneth Perchonok, and Sallyann K. Bagley Feb. 1967 18 p refs
(Contract Nonr-4423(00))
(ONR-H-67-1; AD-649822) CFSTI: HC $3.00/MF $0.65

A fourth experiment was conducted as part of a series designed to test an hypothesis concerning drug enhancement of performance under task-induced stress. The drug conditions included chlordiazepoxide (25 mg.), d-amphetamine (11-17 mg.), placebo and no drug. Other independent variables were latency and input pacing rate. Chlordiazepoxide had a slight tendency to impair performance at both levels of pacing. D-amphetamine confirmed the previously-observed trend to enhance performance at moderate levels of pacing, but significantly impaired it at the extremely high level. Implications are derived for the role of drug effects in filtering strategies. Author (TAB)

N67-29519# Tufts Univ., Medford, Mass. Dept. of Biology.
A HISTOLOGICAL STUDY OF THE CHIMPANZEE EYE Final Technical Report, Sep. 1962–Nov. 1966
Russell L. Carpenter Holloman AFB, N. Mex., Aerospace Med. Div., Mar. 1967 82 p
(Contract AF 29(600)-3554)
(ARL-TR-67-9; AD-650566) CFSTI: HC $3.00/MF $0.65

Thirteen eyes of normal chimpanzees from 1-3/4 to 15 years of age were serially sectioned for histological study. No significant differences related to age could be identified. The chimpanzee eye corresponds closely to the human eye, the chief differences being related to the structures of the anterior chamber angle. Although basically similar to the human, they appear to

represent a stage in evolutionary development somewhat less advanced. The canal of Schlemm is a larger and more irregular channel than the human canal, with its endothelial lining interrupted so that its lumen becomes continuous with the trabecular spaces. The scleral trabeculae are of two kinds, coarse and fine. The coarse ones are like the human scleral trabeculae but are fewer. The fine trabeculae are continuous with the delicate fibrous stroma of the ciliary body which extends between the circular muscle fibers and the longitudinal and oblique fibers, thus filling in the vestigial ciliary cleft. The fine fibers resemble those occupying the chamber angle of the human foetus eye before their atrophy deepens the angle. The uveal trabeculae are histologically identical to those of the human eye but are more numerous and nearly twice their diameter. They collectively correspond to the pectinate ligament of lower mammals. The suprachoroidal lamellae are networks of flat branching elastic trabeculae bearing pigment cells. Although this differs from the usual description of the human suprachoroidea, re-examination of human preparations discloses no difference between human and chimpanzee. Author (TAB)

N67-29549# Lockheed Missiles and Space Co., Sunnyvale, Calif.
PROGRAM FOR DELINEATION OF TRACE CONSTITUENTS OF A CLOSED ECOLOGIC SYSTEM Final Report, 2–29 Jun. 1965
R. W. Rinehart, M. Honma, W. N. Tuttle, R. E. Nygren, O. L. Flowers et al Brooks AFB, Tex., USAF School of Aerospace Med., Jan. 1967 22 p Submitted for publication
(Contract AF 41(609)-2788)
(SAM-TR-67-4; AD-650003) CFSTI: HC $3.00/MF $0.65

The report contains analytical data on 81 samples of gas (27 sets) collected from a simulated space cabin. Each set is comprised of a sample collected cryogenically at 0, -78, and -175C. Analytical procedures are given for the gas chromatography, infrared spectrophotometry, and mass spectrometry utilized in the performance of this project. Possible errors involved in low-level contaminant collection and analysis are included. Author (TAB)

N67-29552*# Air Force Cambridge Research Labs., Bedford, Mass.
RESPONSE TIMES IN DECISION-MAKING TASKS
Everett F. Dagle, Margaret D. Hill, and William R. Smith (Xerox Corp., Rochester, N. Y.) Dec. 1966 14 p *Its* Phys. Sci. Res. Papers no. 300
(AFCRL-66-633; AD-650908) CFSTI: HC $3.00/MF $0.65

The extent to which the output in semiautomated systems that utilize human operators is quantitatively and qualitatively accurate is an obvious function of system performance. When assigned to a logical function in a system, the human operator quite often affects total performance; however, little is known about his sources of error, particularly when his response time is concerned. The study presents experimental evidence which supports the hypotheses that human operators differ widely in the time they require to make decisions and it also provides data that show the degree of consistency or reliability of time measures taken at different times. By using data gathered in the manner outlined in this study, human operators could be matched to command or control systems according to the degree of speed and accuracy required by the particular system. Greater overall efficiency and a maximum output for any given system would be the result. TAB

N67-29565# Joint Publications Research Service, Washington, D. C.
RECENT DEVELOPMENTS IN CYBERNETICS—USSR
29 Mar. 1967 17 p Transl. into ENGLISH from Znannya ta Pratsa (Kiev), no. 11, 1966 p 4–5; 14–16
(JPRS-40456; TT-67-31101) CFSTI: HC $3.00/MF $0.65

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N67-29566# Joint Publications Research Service, Washington, D. C.
SPEECH RECOGNITION MACHINE DEVELOPED BY TWO KIEV SCIENTISTS
S. Andriyev'skyy *In its* Recent Develop. in Cybernetics—USSR 29 Mar. 1967 p 1–5 (See N67-29565 16-05)

A speech recognition device is described that can, in conjunction with a computer, recognize 20 words, permitting the reception of several hundred verbal commands. It is pointed out that differences in human voices do not affect the performance of the machine. The machine was first instructed to recognize the digits from one to nine and then several verbal commands, e.g., stop and start. In order to give the verbal signals a digital form, a spectral analysis of signals was undertaken with the aid of a system of band filters. The sound vibrations were converted to electrical oscillations and then screened through special filters. The distinguishing features of the signal are then stored in the machine's memory in the form of a set of digits. L.E.W.

N67-29567# Joint Publications Research Service, Washington, D. C.
APPLICATIONS OF CYBERNETIC MODELING IN MEDICINE AND SOCIOLOGY
V. Galuzns'ka *In its* Recent Develop. in Cybernetics—USSR 29 Mar. 1967 p 6–12 (See N67-29565 16-05)

The application of cybernetic modeling in surgery and general medicine is discussed. It is pointed out that the patient's history can be encoded on punching machines and fed to a computer and that the computer can answer three questions: diagnosis, risk of operation, and prognosis of recovery. In addition, it provides the information on what specific tests should be made to refine the diagnosis. The machine, therefore, solves two problems: it simplifies the physician's work and facilitates the processing of medical information. The application of cybernetic modeling to sociology is also considered, with regard to problems of labor productivity and the increase in crime. L.E.W.

N67-29578# Naval Research Lab., Washington, D. C.
RAPID BIOLOGICAL DETECTION OF SLIGHT VARIATIONS IN A METAL SURFACE
P. J. Hannan and Constance Patouillet *In its* Rept. of NRL Progr. Jan. 1967 p 1–7 refs (See N67-29577 16-34)

A small (350-ml) mass-culture unit has been used to determine the toxicity of metal specimens to growing cultures of *Chlorella pyrenoidosa* (7-11-05). The procedure consists in measuring the oxygen production of a culture in the linear phase of growth before and after the insertion of a small (0.125-inch-diameter) metal specimen into the culture. Any inhibition of oxygen production caused by the test specimen is evident, usually within an hour and often within 15 minutes. Specimens, identical by spectrographic analyses, often exhibit different toxicities, but the replication of results with a single specimen is good. Repeated exposure of a specimen to fresh algal cultures decreases its toxicity, however, which indicates that there is a gradual loss of toxic material through leaching. Evidence that surface composition of the test specimen determines its toxicity is manifest in several ways; for example, mechanical working or buffing of the specimen often restores the toxicity lost through leaching. There is reason to think that the toxicity of a given specimen can be attributed to an active point constituting only a small portion of the surface. Author

N67-29591# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
RAIL TEST TO EVALUATE EQUILIBRIUM IN LOW-LEVEL WIDEBAND NOISE

Charles W. Nixon, Charles S. Harris, and Henning E. von Gierke Jul. 1966 24 p refs
(AMRL-TR-66-85; AD-643315) CFSTI: HC $3.00/MF $0.65

Psychomotor performance on a rail test was measured during free-field exposure to noise at an overall level of 120 dB re 0.0002 dyne per square centimeter. Subjects wore various combinations of ear protectors to obtain experimental conditions of: (1) sound pressure levels equal in both ear canals (balanced condition) and (2) sound pressure level greater in one ear canal than in the other (unbalanced condition). Man's ability to maintain his equilibrium was adversely affected by the unbalanced noise condition. The rail test may be a useful measure of psychomotor performance in intense noise. Future research will be directed to rail test performance in exposure conditions higher than those employed in this study. Author (TAB)

N67-29596# Service Bureau Corp., New York.
NEUROMIME NETWORK SIMULATOR. APPENDIX II: NEUROMIME SIMULATOR OUTPUT Final Report, 19 Mar. 1963–15 Apr. 1966
James Flaugher Wright-Patterson AFB, Ohio, AMRL, Sep. 1966 378 p
(Contract AF 33(657)-11194)
(AMRL-TR-66-101, Vol. II; AD-650567) CFSTI: HC $3.00/MF $0.65

Because of the large number of network combinations and parameter variations possible in a Steele neuromime network, a program for simulating the nets on a digital computer is being developed to aid in determining the most efficient nets for specific tasks. The results of the investigation of network and parameter variations may then be used as the restraints and design criteria for neuromime devices with specific signal recognition capabilities. The simulation provides as a tool, a means of generating randomly connected networks with desired statistical restraints and a training phase which alters the network in such a manner as to force the actual response closer to the desired response. The generalized nature of the nets used is the essence of the research effort. Appendix II contains the neuromime simulator output. Author (TAB)

N67-29630# George Washington Univ., Alexandria, Va. Human Resources Research Office.
AIRCRAFT DETECTION, RANGE ESTIMATION, AND AUDITORY TRACKING TESTS IN A DESERT ENVIRONMENT
Edward W. Frederickson, Joseph F. Folletie, and Robert D. Baldwin Mar. 1967 49 p refs
(Contract DA-44-188-ARO-2)
(TR-67-3; AD-650403) CFSTI: HC $3.00/MF $0.65

Detection tests with low-flying jet aircraft were conducted to determine the effect of (a) varying the location of observers from the flight path, (b) using optical aids vs. unaided observation, and (c) varying the amount of temporal early warning. Also tested were man's ability to (a) visually estimate the distance to high-speed jets, (b) track aircraft by ear, and (c) determine the distances at which various aircraft structural features were recognized. When distant terrain masking existed, unaided and optically aided detections occurred at approximately the same time. However, when near terrain masking existed, unaided detections occurred sooner. Using binoculars resulted in earlier recognition of structural features. A change from one minute to five minutes of temporal early warning did not affect detection range. As offset increased from 200 meters to 3,300 meters, detection range increased. The range estimation tests were inconclusive. The results of the auditory tracking tests suggest that it may be possible to extend the capabilities of some fair weather air defense systems to poor visibility conditions. The order in which structural features were recognized was different between fighters and bombers, but there were consistencies within each class of aircraft. Author (TAB)

N67-29634# Texas Univ., Austin. Dept. of Psychology.
EFFECTS OF STRESS AND BIRTH ORDER ON ATTITUDE CHANGE
Barry Collins (Calif. Univ., Los Angeles), Robert Helmreich, and Donald Kuiken Mar. 1967 17 p refs
(Contract N00014-67-A-0126-0001)
(TR-2; AD-65015A) CFSTI: HC $3.00/MF $0.65

In a field experiment, the effects of a persuasive communication under high and low stress were assessed. 258 Navy recruits were given a counter-attitudinal communication either under high fear (waiting to go through teargas familiarization) or under relaxed conditions (in their barracks). A mood checklist "take" measure verified that subjects were significantly more frightened in the high stress condition than under low stress. High stress SS showed significantly more attitude change than low stress SS. An interaction between fear and birth order was also found. Later-borns under high fear showed more attitude change than first-borns. Last-borns at least five years younger than their next older sibling (large-gap last-borns) were more similar to first borns than to "small gap" later-borns. TAB

N67-29637# Naval Air Engineering Center, Philadelphia, Pa. Aerospace Crew Equipment Lab.
MODIFIED STETHOSCOPE FOR USE IN AREAS OF HIGH NOISE LEVELS
E. S. Mendelson and Gary L. Kellett 21 Feb. 1967 26 p refs
(NAEC-ACEL-543; AD-649847) CFSTI: HC $3.00/MF $0.65

Copies of a stethoscope which had been modified by medical personnel on an aircraft carrier for use in noisy places, have been evaluated in the fleet and tested in the laboratory. Flight surgeons judged the modification superior to the Navy combination stethoscope and to several other standard types in 15 out of 55 direct comparisons, but the disadvantages of the modified instrument outweighed its advantages. The need for a better noise-excluding stethoscope has been confirmed in this study. Intrinsic deficiencies have been found in the standard devices which were not particularly designed for use in noise. Further work is deemed necessary to develop a more effective and more acceptable stethoscope. Author (TAB)

N67-29659# System Research, Ltd., Richmond (England).
RESEARCH ON CYBERNETIC INVESTIGATION OF LEARNING AND PERCEPTION Final Scientific Report, 1 Sep. 1962–31 Aug. 1966
Gordon Pask Jan. 1967 200 p refs
(Contract AF 16(052)-640)
(AFOSR-67-0861; AD-650290) CFSTI: HC $3.00/MF $0.65

The report describes work on cybernetic models for learning and related processes; it provides simulation data and results from comparative studies of learning in man and in the model. Finally, it refers the reader to publications produced as a consequence of this activity. The main topics are: (1) Simulation of evolutionary processes (capable of interpretation in terms of learning in brains or differentiation within a social aggregate). (2) Artificial Intelligence (or Cognitive Structure) models combined with a resource assignment programme. (3) The experimental control system used in the comparative studies. (4) Brief account of philosophical issues; in particular, the relation between (1) and (2) above. (5) Brief statement of the relation between a cybernetic learning model and a self organizing system. Author (TAB)

N67-29665# Utah Univ., Salt Lake City. Dept. of Psychology.
RESULTS FOR AN ADDITIONAL FOLLOW-UP CRITERION ON A SAMPLE OF AIR FORCE SCIENTISTS
Calvin W. Taylor and Kan Yagi Dec. 1966 16 p refs
(Grant AF-AFOSR-144-63)
(AFOSR-67-0896; AD-651119) CFSTI: HC $3.00/MF $0.65

The report supplements an earlier study (AD-267 832) in which 17 measures of contributions of scientists were used as criteria for validating 130 predictor scores for measuring

psychological characteristics of the scientists. This report relates to an additional over-all criterion that was obtained for 80 of the original 107 subjects. The criterion was a 6-man committee rating of the scientist. The Biographical Information Blank was again the best single predictor instrument of the new criterion. Aptitude test scores ranked more significantly than previously. T-test comparisons are given for 30 empirically keyed Biographical scores. None of the scores based on a criterion of status-seeking, organization-man tendencies was significant with respect to the over-all criterion. Likeableness as a member of the research team was the most important criterion dimension with respect to the over-all criterion. Current organizational status also ranked high. Criterion dimensions of quality of product, originality of product, and creativity ratings had little effect on the over-all criterion rating. Some discussion of these findings and of the explanatory power of the profiles of a scientist's contributions is presented. An analysis of criterion intercorrelations by different sources is presented that shows the complexity of the criterion problem and differences that arise in scores of a scientist's performance dependent on the scorer (the individual himself, immediate supervisors, higher level supervisors, peers).
Author (TAB)

N67-29668# Army Medical Research Lab., Fort Knox, Ky. Experimental Psychology Div.
SOME OBSERVATIONS AND MEASUREMENTS OF THE PANUM PHENOMENON Interim Report
Charles F. Gettys and George S. Harker 13 Apr. 1967 42 p refs
(Rept.-722; AD-649882) CFSTI: HC $3.00/MF $0.65

The angular separation between the binocular and the monocular line of Panum's limiting case was systematically varied under conditions in which the changes in seen relative depth could be quantified. Stereoscopic, equidistant, and anomalous depth localizations were seen. A criterion of variability of depth localization was utilized to differentiate the mechanism operative in determining the seen depth. When stereopsis is clearly present, depth in Panum's limiting case is predictable and reveals a one-to-one relationship with the angle of lateral separation of the stereoscopic stimuli, i.e., the odd line cooperates in free binocular vision with both of the paired lines to give true stereoscopic depth. The range of angular separation over which Panum's limiting case will give rise to stereoscopic depth is increased by free eye movements well beyond the usually reported limits of Panum's retinal areas.
Author (TAB)

N67-29818# Oak Ridge National Lab., Tenn. Health Physics Div.
HEALTH PHYSICS ASPECTS OF SUPERSONIC TRANSPORT
Walter S. Snyder [1966] 18 p refs Presented at the 1st Intern. Congr. of the Intern. Radiation Protection Assoc., Rome, Italy, 5–10 Sep. 1966
(Contract W-7405-ENG-26)
(ORNL-P-2597; CONF-660920-12) CFSTI: HC $3.00/MF $0.65

The ICRP Task Group report estimated, conservatively, that the average dose rate of galactic and solar radiation on a polar route and at 60,000 to 80,000 feet could be as much as 3 mRem/hr. For the great bulk of travelers who make only a few flights a year, this was considered to be well within the limits on exposure of individuals of the population to cosmic radiation as recommended by the ICRP and was not considered to pose a problem. For a courier or crew who continually makes such trips, it was considered to be another matter, and consideration was given to the fact that these people should be classed as radiation workers. It was explained how a schedule of 40 hr/mo in actual flight over high latitudes might entail an average radiation dose of 1.5 Rem/yr; this was considered to be a generally conservative estimate. It was noted that some of the present plans provide for monitoring instruments to be placed aboard aircraft and that these should provide better estimates as to actual radiation doses received. It was also noted by the ICRP Task Group that when time factors and the fraction of the population likely to be involved were taken into account, the contribution to the total genetic load was small.
NSA

N67-29895*# Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
TEMPERATURE CONTROL OF THE ORBITAL OTOLITH EXPERIMENT
Paul R. Schrantz Washington, NASA, Jun. 1967 73 p refs Sponsored in Part by NASA
(Contract NOw-62-0604-c)
(NASA-CR-815; TG-815) CFSTI: $3.00 CSCL 06K

This report presents a description of the temperature control system that has been developed for the Orbital Otolith Experiment. The experiment has been packaged in a cylindrical vessel which will be installed in one of the first manned Apollo vehicles. A water supply in which two frogs are submerged must be maintained at 65 plus or minus 5 F for approximately 1000 hours in orbit. The thermal design approach has been to thermally isolate the capsule from the Service Module. The total heat load may reach 20 watts including a continuous internal load of 12 watts. An evaporative cooling system has been developed for use during the time that the water temperature exceeds a thermostat setting of 65 F. Passive thermal control is employed during conditions of low ambient temperatures as well as during the prelaunch phase, when the evaporative cooler is inoperative. The program has reached the completion of the Engineering Model phase. This report includes a summary of the thermal vacuum test program which was carried out to verify the adequacy of the temperature control system. The results have been implemented in the design of the flight prototype and flight models to be supplied to NASA in 1966.
Author (TAB)

N67-29922# Franklin Inst., Philadelphia, Pa.
EMPIRICAL HUMAN-FACTORS INVESTIGATION OF DISPLAY DESIGN Final Report
Clifton E. Mayfield Apr. 1967 69 p refs
(Contract FAA/BRD-423)
(SRDS-67-12)

Two experiments are discussed in which alphanumeric formats for aircraft flight information are compared. Both experiments utilized a nonintervention dynamic simulation of air traffic which has been called "microsimulation". The first experiment, performed with low traffic densities, indicated that altitude and climb-descent information could suitably be placed in tabular format, if arranged in order of beacon altitude. In this experiment the target-associated identification always remained in the same position with respect to the target. In the second experiment, a similar tabular format was compared with a full three-line target-associated tag which was flipped to a new position (relative to the target) whenever overwrites were imminent. The only significant differences were related to the variances of conflictions called by the controller subjects with the tag format, yielding larger variability than the tabular format. It is suggested that since this tends to overload the communication channels, the tabular format is at least not inferior to the tag format when traffic densities are high as in this experiment.
Author

N67-29923# Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine.
ADAPTATION TO VESTIBULAR DISORIENTATION IV. RESPONSES TO ANGULAR ACCELERATION AND TO BILATERAL CALORIC STIMULATION FOLLOWING UNILATERAL CALORIC HABITUATION
Ruth Ann Mertons and William E. Collins Jan. 1967 14 p refs
(AM-67-2) CFSTI: HC $3.00/MF $0.65

Angular acceleration tests of the vestibular system transcend clinical caloric tests in revealing adaptation to angular accelerations as experienced in rotary motions, including flight situations. The

caloric test is definitely not a substitute for angular acceleration tests. The vestibular system is the system primarily involved in disorientation and vertigo. Adaptation of vestibular responses was obtained by clinical methods (unilateral calorization) and the generalization of this state of adaptation to bilateral (caloric and rotatory) stimulation was examined. Data indicate positive transfer effects for the clinical stimuli but no clear transfer of adaptation occurred with respect to responses elicited by angular accelerations. Further, adaptation of nystagmus by repeated angular accelerations failed to transfer to clinical stimulation. Differences in modes of activation between methods and influences related to stimulation of the gravity receptor were cited as possible causes for the lack of transfer. A subject's state of adaptation to angular accelerations may not be adequately assessed by clinical caloric tests Author

N67-29970# Electrotechnical Lab., Tokyo (Japan).
REVIEW ON COLOR MATCHING FUNCTIONS
Yoshio Sugiyama, Mamoru Suzuki, and Masahiro Fuwa Dec. 1966 112 p refs In JAPANESE; ENGLISH summary
(Rept.-159) CFSTI: HC $3.00/MF $0.65

The color matching functions of the 2° field was recommended by the Commission Internationale de l'Eclairage and its session in 1931, and those for the 10° field was also recommended similarly in 1963, as a supplement to the former ones. The important literatures concerning these color matching functions are summarized, an emphasis being placed on the experiments by Guild and by Wright, and the mathematical transformations by Guild, Smith and Judd, both made for the determination of the 2° field functions, and on the experiments by Stiles and by Speranskaya for the determination of the 10° field functions. In appendices, the methods for the measurement of the relative luminous efficiency function, which is in close connection with the color matching functions, are explained, and the report of Gibson and Tyndall, which has given the basic data to the relative photopic luminous efficiency function adopted in 1924, is collected. Author

N67-29979# Istituto Superiore di Sanita, Rome (Italy). Laboratori di Fisica.
THE SEMINAR AT THE PHYSICS LABORATORY DURING THE PERIOD SEPTEMBER–DECEMBER 1966 [IL SEMINARIO DEI LABORATORI DI FISICA NEL QUADRIMESTRE SETTEMBRE–DICEMBRE 1966]
30 Sep. 1966 104 p refs In ITALIAN; ENGLISH summary
Lectures held in Rome, Sep.–Dec. 1966
(ISS-66/50) CFSTI: HC $3.00/MF $0.65

Conference papers are presented in the following areas of research; genetics and RNA–DNA, bacteriophage and bacteria, irradiation and food, and the central nervous system; current algebra; nuclear structure, elementary particles, particle decay and production, and nuclei; quantum electrodynamics; and magnetic resonance. N.E.N.

N67-29980# Istituto Superiore di Sanita, Rome (Italy). Laboratori di Fisica.
LINES OF RESEARCH IN BIOLOGICAL PHYSICS [LINEE DI RICERCA IN FISICA BIOLOGICA]
M. Ageno 25 Feb. 1967 89 p refs In ITALIAN, ENGLISH summary Presented at Natl. Acad., Lincei, Italy, 11 Mar. 1967
(ISS-67/5) CFSTI: HC $3.00/MF $0.65

Biological physics is defined as a complex of theoretical observations and experimental research which forms a connection between the basic sciences and previous findings, largely logically independent of the biological sciences. The general methods available for carrying out the program of biological physics are then discussed, and, in particular, the one which consists in substituting for the real systems being studied greatly simplified models, which can therefore be calculated, and which have preserved from reality only the aspects essential to the phenomena involved. Following these general remarks, two examples are described in detail to illustrate what has been said. The first of these examples is the problem of the mechanics of DNA, where a connection between biological facts and basic science is clearly possible and depends only on sufficient theoretical and experimental work. In the second example, computers are used in medical diagnoses. Author

N67-30004*# Naval School of Aviation Medicine, Pensacola, Fla.
SERIAL ELECTROCARDIOGRAMS: THEIR RELIABILITY AND PROGNOSTIC VALIDITY OVER A 24-YEAR PERIOD
William R. Harlan, Jr., Albert Oberman, Ashton Graybiel, Robert K. Osborne, Robert E. Mitchell et al. Mar. 1967 27 p refs
(NASA Order R-136)
(NASA-CR-85241; NAMI-999) CFSTI: HC $3.00/MF $0.65 CSCL 06P

Electrocardiographic durations, amplitudes, and vectoral orientations at each of four evaluations in a group of men followed from 24 to 49 years of age were similar to values from cross-sectional surveys of men at the same ages. The pattern of QRS deflections did not change although there were changes in the amplitude of these deflections. A significant decrease in QRS and T amplitude (ΣQRS and ΣT) was found with increasing aging and did not correlate significantly with weight and blood pressure. The QRS axis moved leftward as the group became older and the change in QRS axis was related to interval weight changes and to blood pressure. The T axis and the QRS-T angle did not change during the 24 years of study. The group in whom coronary heart disease subsequently developed had a greater decrease in QRS amplitude and tended to have a greater leftward movement of the QRS vector. The resting electrocardiogram is a reliable measurement despite minor serial changes in amplitude and vectoral orientation but has limited predictive value in men below the age of 50 years. Author

N67-30005* Public Health Service, Cincinnati, Ohio.
ECOLOGY AND THERMAL INACTIVATION OF MICROBES IN AND ON INTERPLANETARY SPACE VEHICLE COMPONENTS Quarterly Report, Jan. 1–Mar. 31, 1967
Robert Angelotti Apr. 1967 16 p refs
(NASA Order R-36-015-001)
(NASA-CR-85238; QR-8) CFSTI: HC $3.00/MF $0.65 CSCL 06M

The dry heat resistance of *Bacillus subtilis* var. *niger* spores in and on various materials was determined. D values for spores encapsulated in epoxy and exposed to temperatures of 115, 125, and 135°C were found to be respectively: D_{115} = 16.1 hours, D_{125} = 5.3 hours, D_{135} = 1.9 hours. The z_D value for spores in epoxy was 21.4 Centigrade degrees with a 95% C.I. of 20.8 to 22.1 Centigrade degrees. D values for spores trapped between stainless steel surfaces mated at 12 and 150 inch-pounds and exposed to 135°C were found to range respectively: D_{135} for 12 inch-pounds = 7.9 to 8.1 minutes and D_{135} for 150 inch-pounds = 22.0 to 25.5 minutes. Inoculated Lucite powders that were stored for two weeks at relative humidities of 20, 40, 60, and 80%, and then formed into rods and exposed to 135°C were found to have D values of 73.5, 88.7, 67.4, and 36.0 minutes, respectively. Author

N67-30011 SAAB Aircraft Co., Linkoping (Sweden).
INTERPRETABILITY STUDIES OF ELECTRONIC FLIGHT INSTRUMENTS
Bengt Bergstrom Jan. 1967 38 p refs
(SAAB-TN-61) CFSTI: $3.00

Different configurations of an electronic head-down display were compared experimentally with regard to interpretability, using tachistoscope techniques. Interpretability was defined in terms of the method of measurement. Out of four scalings of pitch angle, the results clearly favoured a linear and a slightly "broken" scale. Two, more extremely "non-linearized" scales had lower interpretability. Assessment of pitch angle was more precise when the display contained an aircraft symbol that when it did not. In

comparing two different indications of up in the display, a configuration with vertical lines standing on the horizon proved to be more interpretable. Results will be of assistance in choosing between alternative design proposals for a head-down display. Author

N67-30022*# Serendipity Associates, Los Altos, Calif.
A FULL MISSION SIMULATION SCENARIO IN SUPPORT OF SST CREW FACTORS RESEARCH Final Report
Walter B. Gartner, William J. Ereneta, and Vincent R. Donohue Jan. 1967 174 p refs
(Contract NAS2-3589)
(NASA-CR-73096; TR-67-41-2(U)) CSCL 05H

Reported is a study designed to support the development and utilization of a full mission supersonic transport simulation facility by providing materials which will enable research personnel to generate more realistic representations of flight crew workload and operational task conditions in crew factor simulation research projects. Data are organized into three sections. In Part I, the key concepts underlying the development of the simulation scenario are presented. The central concept of crew task demands (CTDs) as simulation referents is introduced and the usefulness of this concept in deriving simulation requirements is elucidated. The concept of functional equivalence is also elaborated as an essential part of the conceptual base established to facilitate scenario development. The simulation scenario, which is a compilation of CTDs occurring throughout a generalized SST flight profile, is presented in Part II. Part III was designed to assist the scenario user in the subsequent derivation of design requirements and utilization plans for the SST simulator. Implications of the simulation requirements expressed in Part II are considered in terms of the essential design features of CDT presentation media which may be selected or designed for use in the simulator. Summary simulation design and/or utilization requirements are provided which identify the presentation media considered appropriate for representing specified subsets of CTDs. It is surmised that the summary requirement statements presented in Part III should thus enable scenario users to determine the CTD presentation materials and techniques needed to implement a given simulation sequence. S.C.W.

N67-30046*# National Aeronautics and Space Administration, Washington, D. C.
VARIABILITY OF RESPIRATORY FUNCTIONS BASED ON CIRCADIAN CYCLES
Karl E. Schaefer and James H. Dougherty, Jr. 22 Nov. 1966 18 p refs
(NASA Order R-24)
(NASA-CR-85267; Rept.-486; AD-649641) CFSTI: HC $3.00/MF $0.65 CSCL 06P

No systematic study of circadian cycles of lung functions has been reported in the literature in which environmental influences were ridigly controlled. In this study, vital capacity, inspiratory capacity, expiratory reserve volume, maximum expiratory flow rate and maximum inspiratory flow rate were measured four times daily at four-hour intervals in two subjects during a control period, during nine days of isolation in a constant environment, and during a three-day recovery period. Temperature was kept at 27°C plus or minus 0.1 degree, barometric pressure 30.560 plus or minus .004 inches. All the lung functions measured showed circadian cycles which shifted during the isolation period in the same direction as sleep-wakefulness cycles, but at a somewhat different rate. Periodicities were determined with computer analysis using a cross-correlation technique with a synthesized 24-hour sinusoid. Average daily variability of lung functions based on circadian cycles ranged from 5.6 plus or minus 1.7% for vital capacity to 20.3 plus or minus 10.4% for maximum inspiratory flow rate. Author (TAB)

N67-30065*# Naval School of Aviation Medicine, Pensacola, Fla.
CONSTITUTIONAL AND ENVIRONMENTAL FACTORS RELATED TO SERUM LIPID AND LIPOPROTEIN LEVELS
William R. Harland, Jr., Albert Oberman, Robert E. Mitchell, Ashton Graybiel and Robert J. Wherry, Jr. 2 Mar. 1967 29 p refs
(NASA Order R-136)
(NASA-CR-85249; NAMI-1000) CFSTI: HC $3.00/MF $0.65 CSCL 06A

Serum lipoproteins and lipids, in 657 men (age 48) were correlated with multiple constitutional and environmental variables. The lipoprotein groups Sf 0-12 and Sf 20-400 had a low intercorrelation and each correlated with different factors. Sf 0-12 lipoproteins were related to constitutional obesity, cigarette smoking, and family history of vascular disease. The Sf 20-100 and Sf 100-400 lipoproteins related to acquired obesity, carbohydrate tolerance, aggressiveness, and sociability. Carbohydrate tolerance, obesity, and personality were apparently independent variables. Serum triglyceride levels correlated with the same variables as the Sf 20-400 lipoproteins; serum cholesterol levels were related to factors that correlated with both lipoprotein groups. The prevalence of familial hyperlipidemias was low, but 18 per cent of individuals with elevated cholesterol and a high risk of coronary heart disease could be tentatively classified as having a type of familial hyperlipidemia. Author

N67-30066* Cincinnati Univ., Ohio. Dept. of Pathology.
THE COMPARATIVE RATES OF ISOLATED MYOCARDIAL CELLS
Carl E. Grinstead, II and B. Black-Schaffer [1964] 12 p refs
(Grant NsG-75-60)
(NASA-CR-85250) CSCL 06A

The individual myocardial cells of newborn mice, rats, and rabbits were separated with trypsin and cultured at 37°C. After the cells were incubated for 24 hours, they had autonomous contractions, averaging 74, 55, and 139 per minute respectively in the mouse, rat, and rabbit. These in vitro rates contrast to their respective in vivo heart rates of 500, 400, and 300 per minute. The heart rates of these mammals were found to be independent of the in vitro, single, myocardial cell rate. Author

N67-30068*# Miami Valley Hospital, Dayton, Ohio. Dept. of Research.
BIOCHEMICAL AND PHYSIOLOGICAL EVALUATION OF HUMAN SUBJECTS IN A LIFE SUPPORT SYSTEMS EVALUATOR
Bernard J. Katchman, George M. Homer, Winslow W. Blanchard, and Dorathea P. Dunco Wright-Patterson AFB, Ohio, AMRL, Feb. 1967 72 p refs
(NASA Order R-85; Contract AF 33(657)-11716)
(NASA-CR-85252; AMRL-TR-66-159) CFSTI: HC $3.00/MF $0.65 CSCL 06S

A 6-week study with four college students as volunteer subjects was conducted for the purpose of evaluating the nutritional requirements of individuals undergoing stresses imposed by simulated aerospace conditions. A 4-day cycle diet of fresh foods was served at room temperature each day; it was comprised of 110 g of protein, 315 g of carbohydrate, 80 g of fat, and 2621 calories. All the clinical data were in the normal range and no significant differences were observed between control and confinement in the Life Support Systems Evaluator. Metabolic balances show excellent adjustment to the diet; all subjects were in positive nitrogen balance. Physiological measurements of heart rate, blood pressure, and oral temperature were in the normal ranges. Minimal body weight changes were observed, indicating that the diet was adequate. The diet was only moderately acceptable because all food was served at room temperature; gravy and cream sauces were rated least acceptable for this reason. Author

N67-30075*# Woods Hole Oceanographic Institution, Mass. Dept. of Chemistry.
SEPARATION OF PROTEINS IN MOLLUSC SHELLS BY GEL-FILTRATION

E. L. Degens, B. W. Johannesson, and R. W. Meyer [1967]
5 p refs
(Contract NSR-22-014-001)
(NASA-CR-85259) CFSTI: HC $3.00/MF $0.65 CSCL 06A

To test an assumption on the formation of mineral nuclei, mollusk shell tissues of widely different biochemical composition and phylogeny were studied by means of enzymatic and non-enzymatic degradation techniques and by gel-filtration. Tryptic digests did not result in the dissolution of shell matrix proteins but treatments with urea, hydroxylamine and formic acid degraded the tissues. A flow diagram depicts the analytic scheme used in this investigation, and it indicates that throughout the molluscan phylum the urea/hydroxylamine fraction is consistently enriched in aspartic acid, lysine and amino sugars although this relationship is not necessarily displayed when these three amino compounds are highly concentrated in the original shell. R.Ll.

IAA ENTRIES

A67-29096
LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS.
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967. 277 p. In English and French.
$14.

CONTENTS:

A67-29097 *
THE SURVIVAL OF MICRO-ORGANISMS IN SPACE - FURTHER ROCKET AND BALLOON-BORNE EXPOSURE EXPERIMENTS.

John Hotchin, Peter Lorenz, Aletha Markusen, and Curtis Hemenway (Union University, Dudley Observatory, Albany; New York State Department of Health, Div. of Laboratories and Research, New York; New York, State University, Albany, N.Y.).
(COSPAR, International Space Science Symposium, 7th, Vienna, Austria, May 10-18, 1966, Paper.)
IN: LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS. [A67-29096 15-04]
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967, p. 1-6.
Grant No. NsG-155-61.

A67-29098 *
A DISCUSSION OF THE PLANETARY QUARANTINE CONSTRAINTS
J. O. Light, C. W. Craven (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.), W. Vishniac (Rochester University, Rochester, N.Y.), and L. B. Hall (NASA, Washington, D.C.).
(COSPAR, International Space Science Symposium, 7th, Vienna, Austria, May 10-18, 1966, Paper.)
IN: LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS. [A67-29096 15-04]
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967, p. 7-21.

A67-29099 *
BIOLOGICAL AND ENGINEERING ASPECTS OF SPACECRAFT STERILIZATION.
Harold G. Lorsch and Martin G. Koesterer (General Electric Co., Missile and Space Div., King of Prussia, Pa.).
(COSPAR, International Space Science Symposium, 7th, Vienna, Austria, May 10-18, 1966, Paper.)
IN: LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS. [A67-29096 15-04]
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967, p. 22-37. 21 refs.
Contracts No. NAS 8-11372; No. NAS 8-11107.

A67-29100
METHODS FOR SPACECRAFT STERILIZATION.
A. K. Astafeeva, V. I. Vashkov, E. N. Nikiforova, and N. V. Ramkova.
IN: LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS. [A67-29096 15-04]
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967, p. 38-43.

Discussion of methods used to destroy terrestrial microflora in space vehicles sent to other planets to protect cosmic space and the planets from contamination by terrestrial micro-organisms. To sterilize separate components, various conditions for dry-heat sterilization can be recommended within the 115 to 200°C range, considering the thermostability of materials. The liquids carried in the spacecraft are sterilized by straining them through asbestos filters, and a gas is used for the final stage of sterilization of spacecraft surfaces. B.B.

A67-29101
EFFICIENCY OF STERILIZATION BY MAKING USE OF ETHYLENE OXIDE AND METHYL BROMIDE MIXTURE.
V. I. Vashkov and A. G. Prishchep.
IN: LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS. [A67-29096 15-04]
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967, p. 44-50.

Analysis of the use of gaseous agents to sterilize spacecraft components. The explosion-proof mixture of ethylene oxide and methyl bromide (OB) is considered; when used at a rate of 1.6 g/liter at 40°C and 30 to 90% relative humidity, sterility is achieved within 2 to 48 hr, depending on the nature of the sterilized material. The high penetrating power of OB (up to 10 mm into rubber) permits the use of paper and polyethylene for packing objects to be sterilized. At room temperature the vapors of the mixture completely volatilize from the sterilized object within five days. B.B.

A67-29102
CARDIOVASCULAR STUDIES DURING AND FOLLOWING SIMULATION AND WEIGHTLESSNESS.
Loren D. Carlson (Kentucky, University, Dept. of Physiology and Biophysics, Lexington, Ky.).
IN: LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS. [A67-29096 15-04]
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967, p. 51-54. 6 refs.

Evaluation of the extent to which the simulation of weightlessness by bed rest and water immersion appears valid. The simulation of weightlessness is compared with the actual state, and it is found that major differences occur in the recovery time of the tilt response and in the extent to which venous filling occurs during a tilt. The application of lower body negative pressure during bed rest is the only measure which seems to have positive results in preventing post-simulation orthostatic intolerance. B.B.

A67-29103
THE EFFECT OF WEIGHTLESSNESS ON THE VIGILANCE FUNCTION IN THE COURSE OF SPACE FLIGHTS [LA PART DE L'ABSENCE DE PESANTEUR DANS LES PROCESSUS DE VIGILANCE AU COURS DES VOLS COSMONAUTIQUES].
R. Grandpierre and G. Chatelier (Ecole Pratique des Hautes Etudes, Laboratoire de Biologie Aérospatiale, Paris, France).
(COSPAR, International Space Science Symposium, 7th, Vienna, Austria, May 10-18, 1966, Paper.)
IN: LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS. [A67-29096 15-04]
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967, p. 58-64. In French.

A67-29104 *

ANALYSIS OF BRAIN WAVE RECORDS FROM GEMINI FLIGHT GT-7 BY COMPUTATIONS TO BE USED IN A THIRTY DAY PRIMATE FLIGHT.

W. R. Adey, R. T. Kado, and D. O. Walter (California, University, Center for Health Sciences, Brain Research Institute, Space Biology Laboratory, Los Angeles, Calif.).

IN: LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS. [A67-29096 15-04]
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967, p. 65-93. 22 refs.
Grants No. NsG-2503; No. NsG-502; No. NsG-505; No. AF AFOSR 246-63; No. AF AFOSR 61-81; Contract No. NAS 0-1970.

Planned study of the central nervous, cardiovascular, and metabolic functions in a 6.8-kg macaque monkey flown in earth orbit for 30 days during 1967. Monitoring of central nervous functions will be done by electroencephalographic (EEG) electrodes in surface and deep brain structures, and by electromyographic recordings from neck and trunk musculature. Behavioral tasks will involved tests of perception and recent memory and eye-hand coordination tests of vestibular functions and spatial orientation. Development of EEG spectral analysis techniques is said to have proven the feasibility of accurate assessment of states of alertness, especially in relation to decision-making requirements, states of drowsiness, fatigue, and detection levels of sleep, including dream states. B.B.

A67-29105

RADIATION MEASUREMENTS ABOARD THE FOURTH GEMINI FLIGHT.

Joseph F. Janni and Marion F. Schneider (USAF, Systems Command, Research and Technology Div., Weapons Laboratory, Kirtland AFB, N. Mex.).

(COSPAR, International Space Science Symposium, 7th, Vienna, Austria, May 10-18, 1966, Paper.)
IN: LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS. [A67-29096 15-04]
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967, p. 94-106. 6 refs.

A67-29106

EXTRATERRESTRIAL VESTIBULAR RESEARCH - A NEW PARTIAL FIELD OF MEDICAL RESEARCH INTO THE HUMAN VESTIBULAR APPARATUS.

Herbert J. Pichler.

IN: LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS. [A67-29096 15-04]
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967, p. 107-110.

Discussion of extraterrestrial research into the human vestibular apparatus for problems of orientation of human beings in space. It is concluded that during space flights outside the earth's magnetic field marked vestibular disorders may occur due to interplanetary or corpuscular radiation. It is indicated that no effective protection against this phenomenon has yet been devised. B.B.

A67-29107

CIRCADIAN RHYTHMS, SPACE RESEARCH AND MANNED SPACE FLIGHT.

Colin S. Pittendrigh (Princeton University, Princeton, N.J.).

IN: LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS. [A67-29096 15-04]
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967, p. 122-134.

Summary of the principal generalizations about free-running circadian oscillations. The circadian period of the free-running oscillation in rodents is discussed, and the nature of the driving oscillation as related to space research is considered. Finally, the physiology of circadian organization and its relation to manned space flight is investigated. B.B.

A67-29108

INDIVIDUAL DIFFERENCES IN PHASE SHIFTS OF THE HUMAN CIRCADIAN SYSTEM AND PERFORMANCE DEFICIT.

George T. Hauty (Delaware, University, Newark, Del.).

IN: LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS. [A67-29096 15-04]
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967, p. 135-147.

At periodic intervals throughout the biological day, assessments were made for a week prior to intercontinental flight yielding a reference of biological time set to the environment of origin, for two weeks at the temporally displaced environment of destination, and for a week following return to the environment of origin. Assessments made included rectal temperature, heart rate, respiratory rate, palmar evaporative water loss, urinalysis, reaction time, decision time, critical flicker fusion, subjective fatigue and well-being, and intellectual facility. The intercontinental flights consisted of east-west and west-east flights which permitted a comparative analysis of bidirectional effects of time zone displacements and a north-south flight which provided an appraisal of effects solely attributable to prolonged flight. Shifts of the phase of circadian periodicity manifested by the physiological functions were effected by the east-west and west-east flights but not by the north-south flight. Bidirectional differences in lag time and extent of dissociation were revealed, but these may be due to individual variability. All flights engendered significant increment in subjective fatigue. Only one flight, the east-west, produced significant performance deficit indicating that while rapid translocation through many time zones does effect physiological phase shifts requiring 4 to 6 days for completion and impairment of well-being, these phenomena are not accompanied by a commensurate change in the efficiency of basic psychological functions. (Author)

A67-29109 *

DAILY RHYTHM CHANGES ASSOCIATED WITH VARIATIONS IN LIGHT INTENSITY AND COLOR.

C. M. Winget (NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.) and D. H. Card (NASA, Ames Research Center, Instrumentation Div., Moffett Field, Calif.).

(COSPAR, International Space Science Symposium, 7th, Vienna, Austria, May 10-18, 1966, Paper.)
IN: LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS. [A67-29096 15-04]
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.

Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967, p. 148-158.
16 refs.

A67-29110 *
HUMAN CIRCADIAN RHYTHMS IN ACTIVITY, BODY TEMPERATURE AND OTHER FUNCTIONS.
Jürgen Aschoff (Max-Planck-Institut für Verhaltensphysiologie, Erling-Andechs, West Germany).
IN: LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS. [A67-29096 15-04]
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967, p. 159-173.
30 refs.
Grant No. NsG-259-62.

From earlier studies in the field of 24-hr rhythms, it has been concluded that the rhythm is an exogenous one, governed by social influences on behavior and, perhaps, by cosmic stimuli. Recently, new steps have been made in two directions: (1) the phase relationships between many rhythmic functions have been described in detail, and (2) it has been demonstrated that the rhythm is based on an endogenous, self-sustained oscillation. In conditions of isolation, subjects show a "circadian" rhythm whose frequency deviates from that of the earth's rotation. In case of such free-running rhythms, it may happen that different functions show different frequencies (internal desynchronization), suggesting that there exists a multiplicity of oscillators in the organism. The implications of these findings for problems in applied physiology are exemplified by the results of experiments in which organisms were exposed to shifts of the entraining light-dark cycle (simulating flights in eastward or westward direction). Re-entrainment lasts longer (and hence also the time of diminished efficiency) after a westward than after an eastward flight. (Author)

A67-29111 *
EFFECT OF REDUCED BAROMETRIC PRESSURE ON WATER AVAILABILITY RELATED TO MICROBIAL GROWTH.
E. J. Hawrylewicz, C. Hagen, V. Tolkacz, and R. Ehrlich (IIT Research Institute, Chicago, Ill.).
IN: LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS. [A67-29096 15-04]
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967, p. 174-186.
8 refs.
Contract No. NASr-22.

Determination of the effect of low barometric pressures and high concentrations of CO_2 in a simulated Martian environment on the survival and growth of B cereus microbes. It is found that after achieving maximum growth in the simulated Martian environment, the micro-organisms immediately enter a growth phase when inoculated into fresh soil. The probability of contamination of Mars by terrestrial micro-organisms is discussed with respect to currently available Martian environmental data. B.B.

A67-29112
ECOLOGICAL PATTERNS OF MICRO-ORGANISMS IN DESERT SOILS.
John B. Opfell and George P. Zebal (Philco-Ford Corp., Aeronutronic Div., Newport Beach, Calif.).
(COSPAR, International Space Science Symposium, 7th, Vienna, Austria, May 10-18, 1966, Paper.)
IN: LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS. [A67-29096 15-04]
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967, p. 187-203.
17 refs.

A67-29113 *
EXTRATERRESTRIAL LIFE DETECTION BY MEANS OF ISOTOPIC OXYGEN EXCHANGE.
Bessel Kok and Joseph E. Varner (Martin Marietta Corp., Martin Co., Research Institute for Advanced Studies, Baltimore, Md.).
(COSPAR, International Space Science Symposium, 7th, Vienna, Austria, May 10-18, 1966, Paper.)
IN: LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS. [A67-29096 15-04]
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967, p. 206-216.
14 refs.
Contract No. NASw-1054.

A67-29114 *
THE INFLUENCE OF SIMULATED LOW-GRAVITY ENVIRONMENTS ON GROWTH, DEVELOPMENT AND METABOLISM OF PLANTS.
R. R. Dedolph (Argonne National Laboratory, Div. of Biological and Medical Research, Argonne, Ill.).
IN: LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS. [A67-29096 15-04]
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967, p. 217-228. 5 refs.
NASA-sponsored research.

Simulation of a zero g environment for oat seedlings, using a horizontal axis clinostat having a rotation rate of 2 rpm. The simulated zero g condition is attested by the inability of plants to perceive unidirectional gravitational force of sufficient magnitude to elicit directional growth. Under such conditions plants are found to grow in the direction imparted by the initial orientation of the plants in the system. The results imply that the primary effect of low-gravity environments on plants is that of modifying the magnitude of respiratory metabolism. B.B.

A67-29115 *
BIOLOGICAL MACROMOLECULE DETECTION BY USE OF A THIACARBOCYANINE DYE.
E. R. Walwick, R. E. Kay, and B. R. Zalite (Philco-Ford Corp., Aeronutronic Div., Newport Beach, Calif.).
(COSPAR, International Space Science Symposium, 7th, Vienna, Austria, May 10-18, 1966, Paper.)
IN: LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS. [A67-29096 15-04]
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.

Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967, p. 229-238.
7 refs.
Contract No. NASw-770.

A67-29117
EXOBIOLOGY AND THE EFFECT OF PHYSICAL FACTORS ON MICRO-ORGANISMS.
A. A. Imshenetskii, S. S. Abyzov, G. T. Voronov, L. A. Kuzhurina, S. V. Lysenko, G. G. Sotnikov, and R. I. Fedorova (Akademiia Nauk SSSR, Institut Mikrobiologii, Moscow, USSR).
IN: LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS. [A67-29096 15-04]
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967, p. 250-260.

Study of the action of different physical factors on micro-organisms. The action of temperature on crystalline preparations of catalase and peroxidase is studied by oscillographic polarography; a determination of the height of polarographic waves at a temperature decrease ranging from 20 to 0°C indicates that structural elements of the peroxidase molecule connected with the enzymatic activity become more stable with decreasing temperature. The growth of Bac. megaterium on liquid growth media in a Mars-simulation chamber is found to cease following a three-week period of UV irradiation. Samples of rocks and stone meteorites were sterilized, incubated in the desert or on Arctic snow, and - after periods of from 100 days to 7 months - investigated. Indications are that microbiological analysis of meteorites fallen in the Arctic or during dry periods in the desert can give reliable results. B.B.

A67-29118
ON THE POSSIBILITY OF PROTRACTED ANABIOSIS IN MICRO-ORGANISMS.
S. S. Abyzov, G. A. Zavarzin, M. V. Ivanov, V. I. Seregin, and O. G. Shirokov (Akademiia Nauk SSSR, Institut Mikrobiologii, Moscow, USSR).
IN: LIFE SCIENCES AND SPACE RESEARCH V; INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 7TH, VIENNA, AUSTRIA, MAY 10-18, 1966, PAPERS. [A67-29096 15-04]
Symposium sponsored by the Committee on Space Research, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and F. G. Favorite.
Amsterdam, North-Holland Publishing Co., 1967, p. 261-267.
11 refs.

Discussion of the possibility of long anabiosis of micro-organisms in permafrost soils, potassium salts, and meteorites. The presence of fossil micro-organisms in ancient rocks is universally recognized, and attempts have been made to prove the presence of viable micro-organisms in such soils. The ability of such organisms to multiply is the only reliable evidence of their viability. This ability can be determined only by the increase in the cell number compared with the control. Three potassium salt samples (age 250 million years) have been investigated, more than 100 inoculations on six growth media being made for each sample. In no case was bacterial growth found. There was also no increase in biomass. Growth was absent in all cases. There is no reason to believe that fossil potassium salts may contain any viable microbes preserved in anabiosis for many millions of years. P.v.T.

A67-29134 *
PROBABILITY AND PAYOFF AS FACTORS INFLUENCING TWO-CHOICE REACTION-TIME.
Arnold F. Kanarick (Massachusetts, University, Amherst, Mass.).
Journal of Engineering Psychology, vol. 5, no. 2, 1966, p. 37-46.
12 refs.
NASA-supported research; NIH Grant No. MH 11044-01A1.

The relative effects of payoff and probability on two-choice reaction-time were investigated. Three levels of probability (.5/.5, .7/.3, and .9/.1) and four levels of payoff (1:1, 2:1, 4:1, and 8:1) were used in factorial combination, with rapid responses to the improbable event rewarded with an amount either equal to or greater than that associated with the more probable event. Response speeds were significantly influenced by both probability and payoff level, probability having the greater effect. The difference in response speeds to the two events was highly correlated with the difference in average gain associated with the events. (Author)

A67-29135
READABILITY AND OPERABILITY OF THREE TYPES OF DIGITAL SWITCHES.
D. W. Plath and P. E. Kolesnik (North American Aviation, Inc., Autonetics Div., Anaheim, Calif.).
(Western Psychological Association, Annual Meeting, 46th, Long Beach, Calif., Apr. 28-30, 1966, Paper.)
Journal of Engineering Psychology, vol. 5, no. 2, 1966, p. 47-53.

The objective of this study was to compare operator performance when using rotary selector, thumbwheel, and digital pushbutton switches. Specific parameters investigated were speed and accuracy of control positioning, and accuracy of control position reading under limited exposure time. Results indicated that positioning performance was significantly faster with the rotary switch than with either the pushbutton or thumbwheel switches, but that reading accuracy was significantly poorer with the rotary switch. No practical differences were obtained among switches for positioning errors. Based on these findings, it was concluded that thumbwheel and pushbutton switches were superior to rotary switches, where accuracy of reading is more important than speed of setting. (Author)

A67-29267 *
THRESHOLDS FOR THE PERCEPTION OF ANGULAR ACCELERATION IN MAN.
Brant Clark (NASA, Ames Research Center, Moffett Field, Calif.).
Aerospace Medicine, vol. 38, May 1967, p. 443-450. 63 refs.

The paper reviews 25 studies which report stimulus thresholds for the perception of angular acceleration in man. These reports constitute a miscellany of definitions of threshold, rotation devices, and psychophysical methods. The thresholds reported varied between 0.035 and 8.2°/sec^2 with a median of about 1°/sec^2. The results of the effects of several experimental variables on thresholds are reviewed. The data support the notion that man is extremely sensitive to angular acceleration, particularly under optimum conditions. However, two critical limitations of these studies - i.e., the small number of observers studied and the lack of direct measures of angular acceleration - and the variation in methodology between studies limit the generalizations from the data. (Author)

A67-29268 * #
INFLUENCE OF CHRONIC ACCELERATION ON THE EFFECTS OF WHOLE-BODY IRRADIATION IN RATS.
Harold W. Casey (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Biosciences Branch, Brooks AFB, Tex.), Donald R. Cordy (California, University, Dept. of Pathology, Davis, Calif.), Marvin Goldman (California, University, Dept. of Physiological Sciences, Davis, Calif.), and Arthur H. Smith (California, University, Dept. of Animal Physiology, Davis, Calif.).
Aerospace Medicine, vol. 38, May 1967, p. 451-457. 17 refs.
Navy-supported research; Grant No. NGR-05-004-008.

Studies of the combined effects of chronic acceleration and acute Co^{60} whole-body irradiation were performed on rats. Rats exposed to accelerative forces (2.0 to 3.0 g), produced by continuous centrifugation, were observed for periods up to four months. Deleterious effects were not produced by acceleration per se, as physiologic adaptation was evident by the seventh to fourteenth day. On gross and histologic examinations a depletion of body fat deposits and a

reduction in body mass were the only detectable differences in accelerated rats when compared with control rats. Continuous acceleration, immediately following irradiation, increased radiation mortality and the mortality increased progressively with increases in the accelerative force. In accelerated-irradiated rats that died, the lesions found by gross and histologic examinations were typical of those produced by radiation. Accelerated rats, sacrificed 30 days following irradiation, had lesions comparable to nonaccelerated irradiated rats indicating that the pathologic changes produced by irradiation were not altered by acceleration. The results show that the biologic response to whole-body irradiation is altered by changing the weight to mass ratio with accelerative forces above normal gravity. The exact cause of the increased mortality was not determined. These findings suggest additional radiation studies should be conducted in environments both below and above that of normal gravity. (Author)

A67-29269

SUBJECTIVE RESPONSES TO OSCILLATION IN YAW.

Robert L. Cramer (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, ENT Branch, Vestibular Section, Brooks AFB, Tex.).

Aerospace Medicine, vol. 38, May 1967, p. 457, 458.

Consideration of applying to subjective responses the technique of determining the phase distortions existing between harmonically varying angular accelerations and the harmonically varying responses elicited by them. It was found that the sensations of turning elicited by oscillation on the yaw axis are subject to a phase distortion which is dependent on the oscillation frequency. Proper training should reduce this source of pilot error. F.R.L.

A67-29270

PLASMA 17 HYDROXYCORTICOSTEROIDS IN HEALTHY SUBJECTS AFTER WATER IMMERSION OF TWELVE HOURS' DURATION.

Jacqueline L. Claus Walker (Texas Institute for Rehabilitation and Research; Baylor University, College of Medicine, Dept. of Rehabilitation and Dept. of Biochemistry, Houston, Tex.).

Aerospace Medicine, vol. 38, May 1967, p. 459. 8 refs.
PHS Grant No. FR-00129; VRA Grant No. RT-4.

The Plasma 17 hydroxycorticosteroids were measured by the Nelson and Samuels method in six healthy subjects before and after water immersion at 93°F of 12-hr duration. The test was repeated several days after the first immersion. There was no significant difference in the concentration of 17 hydroxycorticosteroids in the plasma withdrawn before of after water immersion. (Author)

A67-29271 *

PLASMA VOLUME AND TILT TABLE RESPONSE TO WATER IMMERSION DECONDITIONING EXPERIMENTS USING EXTREMITY CUFFS.

Fred B. Vogt (Texas Institute for Rehabilitation and Research; Texas, University, Graduate School of Biomedical Sciences, Houston, Tex.).

Aerospace Medicine, vol. 38, May 1967, p. 460-464. 8 refs.
Contract No. NAS 9-5821; NIH Grant No. FR-00254.

The plasma volume and tilt table response of six healthy adult male subjects was evaluated before and after six periods of water immersion deconditioning. The immersion periods were of 12-hr duration. A Latin Square experimental design was utilized employing six different treatments: (1) water immersion, no cuffs, (2) water immersion, no cuffs, (3) water immersion with arm cuffs, 1-min-on, 1-mm-off, (4) water immersion with arm cuffs, 2-min-on, 4-min-off, (5) water immersion with arm cuffs, 5-min-on, 10-min-off, and (6) water immersion with leg cuffs, 5-min-on, 10-min-off. The cuffs were inflated to an effective pressure of 60 to 70 mm Hg. The subjects were immersed in a sitting position, head out, with the water temperature maintained at 93°F. The results of the study indicate that cardiovascular deconditioning occurred during immersion as is evidenced by a decline in plasma volume and in tilt table manifestations of orthostatic intolerance. There was no statistically significant difference in the tilt table response or plasma volume changes for any of the experimental treatment conditions. The results thus indicate that in this group of subjects, under well controlled experimental conditions, a protective effect was not noted with the use of extremity cuffs. The mechanism for the apparent protection afforded by cuffs in other experiments, and not in this study, is not evident. (Author)

A67-29272 #

INITIAL CARDIOVASCULAR RESPONSE TO LOW FREQUENCY WHOLE BODY VIBRATION IN HUMANS AND ANIMALS.

James G. Clark, Jerry D. Williams, William B. Hood, Jr., and Raymond H. Murray (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio; Indiana University, Cardiopulmonary Laboratory, Bloomington, Ind.).

Aerospace Medicine, vol. 38, May 1967, p. 464-467. 16 refs.
Contract No. AF 33(616)-8378.

Measurements of cardiovascular function were made during the onset of whole body, X-axis sinusoidal vibration in anesthetized mongrel dogs and awake unsedated human volunteers. The anesthetized animals showed a drop in mean arterial pressure averaging 27 mm Hg. An increase in heart rate occurred during the blood pressure drop. Awake humans revealed no drop in mean arterial pressure during this time interval. In addition, four dogs had electromagnetic flow probes placed around the ascending aorta and subjected to whole body, X-axis, sinusoidal vibration. A drop in mean arterial pressure occurred during the onset of vibration but flow was maintained by the increased heart rate suggesting a fall in peripheral vascular resistance. Mechanisms are postulated to explain these findings. (Author)

A67-29273

HOMEOSTATIC REGULATION OF THE CIRCULATION DURING PROLONGED GRAVITATIONAL STRESS ($+G_z$).

L. Offerhaus (Amsterdam, University, Dept. of General Pathology, Amsterdam, Netherlands) and J. C. Dejongh (Nationaal Luchtvaartgeneeskundig Centrum, Soesterberg, Netherlands).

Aerospace Medicine, vol. 38, May 1967, p. 468-475. 62 refs.

During quiet standing, upright tilting and prolonged low-level gravitational stress ($+G_z$) in the human centrifuge, two types of circulatory readjustment may be observed, both of which are probably triggered by insufficient filling of the arterial system. Direct and indirect evidence was obtained that these three forms of gravitational stress are accompanied by increased secretion or release of catecholamines. Total blood volume is readjusted by renal retention of water and sodium. The characteristic pattern of delayed antidiuresis which usually accompanies quiet standing was also observed after the centrifuge experiments. Some of the homeostatic mechanisms which may cause such a pattern are discussed. Both increased secretion of aldosterone and of antidiuretic hormone are probably contributing factors, but neither can explain the complete pattern of antidiuresis. Differences between $+1\ G_z$ (quiet standing and upright tilting) and $+3\ G_z$ were of a quantitative nature only. (Author)

A67-29274 *

ADVANCED VISION RESEARCH FOR EXTENDED SPACEFLIGHT.

Walton L. Jones, William H. Allen, and James F. Parker, Jr. (NASA, Office of Advanced Research and Technology, Washington, D.C., and NASA, Ames Research Center, Moffett Field, Calif., and Biotechnology, Inc., Arlington, Va.).

Aerospace Medicine, vol. 38, May 1967, p. 475-478. 9 refs.

Outline of the approach being used in NASA to study the visual problems in extended space flight, including a description of certain specific projects presently underway. Primary parameters of the visual environment of space are tabulated and discussed. Attention is given to operational vision requirements, visual performance in space, and vision protection requirements. F.R.L.

A67-29275
BLOOD PRESSURE CHANGES AND PULMONARY EDEMA IN THE RAT ASSOCIATED WITH HYPERBARIC OXYGEN.
Charles D. Wood, Lloyd D. Seager, and Gene Perkins (Arkansas, University, Medical School, Dept. of Pharmacology, Little Rock, Ark.).
Aerospace Medicine, vol. 38, May 1967, p. 479-481. 18 refs.
NIH Grant No. HE 09963.

Rats exposed to hyperbaric oxygen at pressures of 3 atm abs develop elevated blood pressures, bradycardia and severe pulmonary edema. Rats subjected to 3-atm abs pressure with intermittent wash out with moderate changes in pressure develop edema more readily than those subjected to 3 atm with continuous O_2 flow. Elevations of systemic blood pressure in both groups of animals are in the range which when produced by other methods are invariably associated with pulmonary edema. The mechanism of pulmonary edema with hyperbaric oxygen appears to be the result of sustained hypertension that exceeds the capacity of the left heart. A rise of pulmonary venous pressure as a result produces pulmonary edema. A sympathetic discharge from central nervous system structures appears to be the mechanism for this hypertension and resulting pulmonary edema. Blood pressure should be monitored in all patients treated with hyperbaric oxygen as a precaution against this condition. (Author)

A67-29276 #
PROLIFERATIVE PULMONARY LESIONS IN MONKEYS EXPOSED TO HIGH CONCENTRATIONS OF OXYGEN.
Farrel R. Robinson (USAF, Veterinary Corps, Washington, D.C.), David T. Harper, Jr., Anthony A. Thomas, and Harold P. Kaplan (USAF, Washington, D.C.).
Aerospace Medicine, vol. 38, May 1967, p. 481-486. 13 refs.
USAF-sponsored research.

Forty monkeys (Macaca mulatta) were exposed to 99 to 100% oxygen at pressures from 600 to 760 mm Hg. The acute exudative pulmonary response was seen in only three exposed at 760 mm Hg. The subacute proliferative pulmonary response was seen at all levels studied, the degree being directly related to time-dose exposures. In the high dose ranges clinical signs of illness were evident after 5 to 7 days exposure when the monkeys became listless and anoretic. By 14 days they were quite lethargic and had assumed a huddled position. Grossly, the heavy lungs had a gray, bloodless appearance. Microscopically, there was extreme proliferation of the interstitium and alveolar epithelium. None of the monkeys died that were exposed at 600 mm Hg, although mild focal proliferative changes were seen. After 31 days postexposure, these changes appeared as focal areas of atelectasis with mild septal fibrosis. (Author)

A67-29277 *
LACK OF RESPONSE TO THERMAL STIMULATION OF THE SEMICIRCULAR CANALS IN THE WEIGHTLESS PHASE OF PARABOLIC FLIGHT.
Robert S. Kellogg (USAF, Washington, D.C.) and Ashton Graybiel.
Aerospace Medicine, vol. 38, May 1967, p. 487-490. 11 refs.
NASA-sponsored research.

The objective of this study was to clarify the mechanism of caloric nystagmus in man by conducting the test in weightlessness. Eight subjects were selected on the basis of a strong nystagmus response to irrigation with ice water. Nystagmus was determined by oscillograph tracings and direct observation, and subjective responses of the subject were obtained. The experimental evidence indicated that, under the conditions of this experiment, zero gravity completely suppressed caloric nystagmus. This supported Bárány's original hypothesis that caloric nystagmus was dependent on difference in specific weight of the endolymph in the horizontal canal. (Author)

A67-29278 * #
DETAILED STUDY OF CONTAMINANT PRODUCTION IN A SPACE CABIN SIMULATOR AT 760 MM OF MERCURY.
J. P. Conkle, W. E. Mabson, J. D. Adams, H. J. Zeft, and B. E. Welch (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 38, May 1967, p. 491-499. 18 refs.
NASA Contract No. R-89.

A 27-day experiment designed to determine man's contribution to trace contaminants in a sealed environment was conducted jointly by the USAF and NASA. A total of 97 compounds were identified and quantified during the 27 days. Twenty-one compounds were noted only during the manned portion of the study. Direct analysis of the sealed environment was not adequate for this type of comprehensive survey. The use of cryogenic fractionation and concentration, however, did provide samples with sufficient concentration of contaminants for analysis by means of gas chromatography, IR spectroscopy, and mass spectroscopy. Carbon monoxide was the only compound which was produced by man at such a rate that clearly would require removal in long-term sealed atmospheric system habitation. (Author)

A67-29279
SIMULATED ALTITUDE AND IODINE METABOLISM IN RATS. I.
Gilles LaRoche (Rhode Island, University, Narragansett Marine Sport Fish Laboratory, Narragansett, R.I.) and C. L. Johnson (Western Fish Nutrition Laboratory, Cook, Wash.).
Aerospace Medicine, vol. 38, May 1967, p. 499-506. 40 refs.

Rats exposed to simulated altitude of 17,000 ft (395 mm Hg) show acute changes in iodine metabolism which suggest that in the early stages of treatment there is a profound dichotomy between rates of thyroidal iodine uptake and secretion. This disruption of the glandular "steady state" was identified through changes in distributions of I^{125} and I^{127} in the thyroid and the serum of treated and control rats. The probable relationship between the thyroid and the adrenals is briefly discussed. (Author)

A67-29280 *
PULMONARY MECHANICS ASSOCIATED WITH OXYGEN TOXICITY AND A SUGGESTED PHYSIOLOGICAL TEST FOR SUSCEPTIBILITY TO THE EFFECTS OF OXYGEN.
Edward J. Burger, Jr. (Harvard University, Harvard School of Public Health, Dept. of Physiology, Boston, Mass.).
Aerospace Medicine, vol. 38, May 1967, p. 507-513. 26 refs.
PHS Grant No. 2-T1-GM-409-06; Grant No. NsG(T)-89.

Five healthy male subjects were exposed to pure oxygen at 0.39, 0.5, 1.0, and 2.0 atm abs for a 3-hr period each. The subjects were admonished not to take deep breaths during the period of exposure. Transpulmonary pressures were measured at known absolute lung volumes following exposure and were compared with air control curves. The results of these measurements and of their relationship to symptoms indicated that absorption atelectasis had occurred in 14 out of 24 trials. Further evidence for this phenomenon was obtained by comparing the results of these experiments with others in which atelectasis had purposely been provoked. A method for the identification and selection of susceptible individuals was suggested. These results were contrasted with apparent direct toxicity of oxygen during an additional, prolonged exposure to oxygen at 2.0 atm. (Author)

A67-29281 *
PROLONGED RECORDING FROM SINGLE VESTIBULAR UNITS IN THE FROG DURING PLANE AND SPACE FLIGHT, ITS SIGNIFICANCE AND TECHNIQUE.
T. Gualtierotti and D. S. Alltucker (NASA, Ames Research Center, Moffett Field, Calif.).
Aerospace Medicine, vol. 38, May 1967, p. 513-517. 8 refs.

Study of how sensors long adapted to a constant environment will respond when the environment is radically changed. The vestibular apparatus is especially affected by the acceleratory changes from multi-g profiles to weightlessness during aircraft and space flight.

Single-unit recordings allow a good quantitative analysis, especially if several receptors are studied simultaneously for an extended time. The main technical problems involved consist of withstanding high acceleration and vibration and maintaining the continual response of the unit for a two- to three-day period. The first problem has been solved by utilizing floating microelectrodes of the same density as the nerve tissue and by keeping the subject (a frog) submerged. A specially designed life-support system was used. Technical and interpretation problems are discussed. F.R.L.

A67-29282

ZERO BUOYANCY - SIMULATION OF WEIGHTLESSNESS TO EVALUATE PSYCHOPHYSIOLOGICAL AND ANTHROPOMORPHIC PARAMETERS THAT AFFECT SPACE STATION DESIGN.

Carl R. Adams and George K. Bulk (Douglas Aircraft Co., Inc., Advance Biotechnology Dept., Man-System Integration Branch, Santa Monica, Calif.).

Aerospace Medicine, vol. 38, May 1967, p. 518-520. 6 refs.

The paper summarizes progress in the use of the neutral-buoyancy (water immersion) technique for simulated space crewman performance. A description of some of the psychophysiological, man-machine, and anthropomorphic parameters, as they affect space station design, is presented together with a number of general conclusions about six-degree-of-freedom motion simulation. The conclusions are based on studies of techniques for locomotion, body orientation, restraint, rescue operations, extravehicular activities (EVA), assembly and repair operations, exercise, and so forth. The studies indicate that locomotion can be satisfactorily effected by one- or two-handed translational movements or by one- or two-handed compression ambulation, but that only very slow translational movements are possible when Velcro tape is used for frictional effect. Various reactive motions which result from applied forces are either greatly reduced or virtually eliminated with the use of simple restraining devices. The studies also show that the orientation of sleeping position (relative to the deck) is unimportant if some form of light, comfortable restraint is used. (Author)

A67-29283

RADIOACTIVITY IN CIVILIAN NORWEGIAN PILOTS.

Birger Hannisdahl (Scandinavian Airlines System, Oslo, Norway) and Aksel Stromme (State Institute of Radiation Hygiene, Montebello, Norway).

Aerospace Medicine, vol. 38, May. 1967, p. 521, 522.

A study of radioactivity using the Cs^{137} isotope as the radioactive agent was made in a group of civilian Norwegian pilots whose ages were between 35 and 45 years and of average height and weight. In order to compare the results of the data obtained from the pilots with that of other groups of the population, three groups were selected: (1) a group of adult men with similar characteristics as the pilots, from a community on the west coast of Norway where radioactive fallout has been especially high, (2) a group of men from Oslo, and (3) a group of school youngsters. The results showed that the radioactive effect in the pilots was about the same level as that for men living in Oslo, and much lower than that in the other observed groups. (Author)

A67-29284 #

DISEASE VECTOR TRANSPORT BY AIRCRAFT - AN INTERNATIONAL HEALTH PROBLEM.

Roy L. De Hart (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).

Aerospace Medicine, vol. 38, May 1967, p. 522-524. 14 refs.

Consideration of potential health hazards of international scope introduced by advances in air transport. Without adequate preventive measures, the introduction of viable infected arthropod vectors into a new but compatible environment could provide the spark for a medical conflagration. The ability of potential vectors to survive the environmental extremes of aircraft operation are reviewed. The numbers and types of arthropods discovered on international flights are enumerated, with particular emphasis given to vectors of diseases such as yellow fever, malaria, filariasis, and encephalitis. F.R.L.

A67-29293 *

DETERMINATION AND EVALUATION OF RATE MEASUREMENTS IN THE ANALYSIS OF SPACE MEDICAL DATA.

John C. Townsend (Catholic University of America, Washington, D.C.) and Jefferson F. Lindsey, Jr. (NASA, Office of Manned Space Flight, Washington, D.C.).

Multivariate Behavioral Research, vol. 2, Jan. 1967, p. 63-70.

Measures of rate of change and of rate of rate of change are developed for application to physiological and psychological data. Examples are given of the use of these measures with heart-rate data for comparisons within and between subjects. It is shown that the measures provide information over and above that offered by means and variances, and that the measures appropriately reflect the impact of external variables. (Author)

A67-29294 *

THE NEUROPHYSIOLOGY OF ANESTHESIA.

Wallace D. Winters, Kenjiro Mori, Charles E. Spooner, and Robert O. Bauer (California, University, Center for Health Sciences, Brain Research Institute and Dept. of Pharmacology, and Dept. of Anesthesiology, Los Angeles, Calif.).

Anesthesiology, vol. 28, Jan.-Feb. 1967, p. 65-79; Discussion, Fink, Frederickson, and Kitahata, p. 79, 80. 23 refs.
PHS Grant No. MH-6415-08; Contract No. AF 49(638)-1387; Grant No. NsG-237-62.

Consideration of states induced by various anesthetics to determine whether all agents used in anesthesiology meet the classical definition of anesthesia and what constitutes the anesthetic state in cases where these agents do not meet the classical definition. Studies are made of cats which had chronically implanted monopolar cortical and bipolar subcortical leads. The neurophysiological effects induced by various drugs used as anesthetics are compared, and the results are tabulated. F.R.L.

A67-29297 *

INTERNATIONAL LIQUID CRYSTAL CONFERENCE, KENT STATE UNIVERSITY, KENT, OHIO, AUGUST 16-20, 1965, PROCEEDINGS. PART 1.

Conference supported by the U.S. Air Force, the U.S. Army, NASA, Contract No. NSR-36-007-013, the Procter and Gamble Co., Picker X-Ray Corp., Polacoat, Inc., the Radio Corporation of America, the Westinghouse Electric Corp., the Matheson Scientific Co., the C. P. Hall Co., the E. H. Sargent Co., and the Kent State University.
Molecular Crystals, vol. 1, no. 2, 1966. 153 p. In English and French.

CONTENTS:

THE INFLUENCE OF MOLECULAR STRUCTURE ON LIQUID CRYSTALLINE PROPERTIES. G. W. Gray (Hull, University, Hull, Yorks., England), p. 333-349.

A67-29439 * #
WATER IMMERSION SIMULATION OF EXTRAVEHICULAR ACTIVITIES BY ASTRONAUTS.
Otto F. Trout, Jr. (NASA, Langley Research Center, Applied Materials and Physics Div., Spacecraft Systems Branch, Hampton, Va.).
(American Institute of Aeronautics and Astronautics, Annual Meeting, 3rd, Boston, Mass., Nov. 29-Dec. 2, 1966, Paper 66-903.)
Journal of Spacecraft and Rockets, vol. 4, June 1967, p. 806-808. 6 refs.

A67-29450 * #
RADIATION HAZARD TO MAN FROM SOLAR PROTON EVENTS.
Joseph W. Snyder (NASA, Manned Spacecraft Center, Space Physics Div., Houston, Tex.).
Journal of Spacecraft and Rockets, vol. 4, June 1967, p. 826-828. 9 refs.

Statistical analysis of the solar-proton events of the last solar cycle to obtain probability distributions of the extreme radiation environments which can be expected during missions to Mars and Venus. It is pointed out that the increased danger of high doses during solar maximum is significant. The environment presented can be used for guidance in shielding design and reliability analysis of manned spacecraft exposed to solar-proton events, considering the assumptions and uncertainties pertaining to future solar activities. M.F.

A67-29648 *
LIVING RELATIVE OF THE MICROFOSSIL KAKABEKIA.
S. M. Siegel, Karen Roberts, Henry Nathan, and Olive Daly (Union Carbide Corp., Research Institute, Tarrytown, N.Y.).
Science, vol. 156, June 2, 1967, p. 1231-1234.
Contract No. NASw-767.

A living, ammonia-obligate, umbellate form, similar to the Precambrian microfossil Kakabekia umbellata Barghoorn, has been isolated from two soil specimens collected at Harlech, Wales. This organism is amenable to culture on agar and in broth. The two soil specimens are similar in that they differ from a typical clay loam in high content of carbon, hydrogen, and organic nitrogen and low levels of sodium, potassium, and titanium. In all other constituents, such as calcium, magnesium, and iron, they are quite dissimilar. Kakabekia-like forms can be grown in glucose-ammonia media with the latter as the sole source of nitrogen, but they can also be grown on peptone and silicate in glucose-free media. Ammonia is necessary, and growth is always slow without glucose. The fission process was not observed, but the enlargement and differentiation of a preumbellate structure into its "mature" form, followed by disintegration (senescence) of this stage, was seen. An ontogeny is proposed in which the stalk and basal bulb of the complete umbellate structure are assumed to be part of the reproductive apparatus. (Author)

A67-29894
RECOGNITION OF LUNAR CRATERS.
James Wilde, James Williams (Kollsman Instrument Corp., Systems Management Div., Syosset, N.Y.), and Jerome Siegel (Kollsman Instrument Corp., Syosset, N.Y.).
Human Factors, vol. 9, Feb. 1967, p. 33-38. 7 refs.

Recognition thresholds for lunar crater size were determined, analytically, for various look angles and magnifications, at an orbital altitude of 80 n mi. Elliptical image measurements for various sized craters were combined with some previous threshold recognition data for the ellipse (Casperson, 1950). Elliptical image measurements consisted of the visual angle of the major axis, and elliptical form (the ratio of minor axis to major axis). A computer program was generated from which the visual angle and form measurements of anticipated elliptical crater images were computed for various combinations of crater size, look angle, and magnification. Casperson's data was then reworked to obtain the visual angle and form measurements associated with his recognition threshold data for the ellipse. By graphically combining the visual angle and form data from both computations, 50% and 75% threshold recognition curves were generated, relating crater size, magnification and look angle. Implications of these data are discussed. (Author)

A67-29895
AN EVALUATION OF FOUR METHODS OF MONITORING SIMULTANEOUS PRIMARY AND SECONDARY VOICE MESSAGES.
William E. Williams and Donald D. Young (Philco-Ford Corp., WDL Div., Operations Design Dept., Human Engineering Section, Palo Alto, Calif.).
Human Factors, vol. 9, Feb. 1967, p. 45-52. 15 refs.
Contract No. AF 04(695)-880.

Four methods of monitoring simultaneous primary and secondary voice messages were investigated in high and low ambient noise environments. Two of the methods used a single earpiece headset and wall speaker, and two methods used dual earpiece headset with either the primary message in one ear and the secondary message in the other ear, or the primary message in both ears and the secondary message in a single ear. A realistic script and operational setting were used to test the conditions using 54 trained subjects. The dual-headset methods were found to be significantly superior to the headset/speaker method in most scoring categories. No significant differences were found between noise levels. The findings are compared with previous research on multimessage monitoring. (Author)

A67-29897
THE UTILIZATION OF HUMAN FACTORS INFORMATION BY DESIGNERS.
David Meister (Bunker-Ramo Corp., System Effectiveness Laboratory, Canoga Park, Calif.) and Donald E. Farr (Bunker-Ramo Corp., Canoga Park, Calif.).
Human Factors, vol. 9, Feb. 1967, p. 71-87. 6 refs.
Contract No. Nonr-4974-00.

Ten packaging designers were tested on three specially developed tests which required them to analyze various design situations and to construct a conceptual drawing of the equipment configuration according to design specifications. Five human factors specialists were also tested on several sub-test items. Designers appear to have little or no interest in human factors criteria or information and usually fail to consider human factors in their designs. Their analysis of design requirements is minimal and shallow. Human factors personnel reacted in a manner similar to designers in terms of overall design criteria. (Author)

A67-29918 #
PROGRESS IN LONG-TERM BIOMEDICAL MONITORING OF HUMAN HEART RATE THROUGH THE USE OF LITHIUM CHLORIDE IMPREGNATED BALSA ELECTRODES.
Franklyn K. Coombs (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
IN: 1967 SWIEEECO RECORD; INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, ANNUAL SOUTHWESTERN CONFERENCE AND EXHIBITION, 19TH, DALLAS, TEX., APRIL 19-21, 1967, TECHNICAL PROGRAM PAPERS. [A67-29901 15-09]
Edited by A. A. Dougal.
New York, Institute of Electrical and Electronics Engineers, Inc., 1967, p. 10-2-1 to 10-2-7.

An electrode system for long-term monitoring of heart rate during space flights has been developed. Lithium chloride balsa electrodes were used on human volunteers for periods exceeding 30 days. The electrodes are essentially dry and require no skin preparation. When used with a very high input impedance amplifier, these electrodes will deliver an ECG suitable for electronic heart rate analysis under the variety of tasks expected of an astronaut. (Author)

A67-29919
HIGH-IMPEDANCE ELECTROCARDIOGRAM AMPLIFIER-TRANSMITTER FOR USE WITH DRY ELECTRODES.
Jack B. Johnson (Southern Research Support Center, Veterans Administration Hospital, Little Rock, Ark.) and James E. Allred (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
IN: 1967 SWIEEECO RECORD; INSTITUTE OF ELECTRICAL AND Aerospace Medicine, vol. 38, May 1967, p. 513-517. 8 refs.

Study of how sensors long adapted to a constant environment will respond when the environment is radically changed. The vestibular apparatus is especially affected by the acceleratory changes from multi-g profiles to weightlessness during aircraft and space flight. Single-unit recordings allow a good quantitative analysis, especially if several receptors are studied simultaneously for an extended time. The main technical problems involved consist of withstanding high acceleration and vibration and maintaining the continual response of the unit for a two- to three-day period. The first problem has been solved by utilizing floating microelectrodes of the same density as the nerve tissue and by keeping the subject (a frog) submerged. A specially designed life-support system was used. Technical and interpretation problems are discussed. F.R.L.

A67-29920
A LINEAR BEAT-BY-BEAT CARDIOTACHOMETER.
Fred B. Vogt and Thor O. Hallen (Texas, University, Graduate School of Biomedical Sciences, Houston, Tex.).
IN: 1967 SWIEEECO RECORD; INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, ANNUAL SOUTHWESTERN CONFERENCE AND EXHIBITION, 19TH, DALLAS, TEX., APRIL 19-21, 1967, TECHNICAL PROGRAM PAPERS. [A67-29901 15-09]
Edited by A. A. Dougal.
New York, Institute of Electrical and Electronics Engineers, Inc., 1967, p. 10-4-1 to 10-4-8.

Successive cardiac beats are recognized with a special preprocessing circuit that discriminates against noise artifacts in the electrocardiogram. The preprocessor output consists of a rectangular pulse representative of each cardiac cycle. The time interval between cardiac cycles is represented by an analog voltage proportional to the interval between successive pulses. Computation of the reciprocal of this voltage results in an output representative of the beat-to-beat heart rate. (Author)

A67-29921 #
DESIGN AND DEVELOPMENT OF A DIGITAL CARDIOTACHOMETER.
Adolph W. Foeh, Jr. (USAF, Systems Command, Aerospace Medical Div., Biomedical Engineering Branch, Brooks AFB, Tex.).
IN: 1967 SWIEEECO RECORD; INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, ANNUAL SOUTHWESTERN CONFERENCE AND EXHIBITION, 19TH, DALLAS, TEX., APRIL 19-21, 1967, TECHNICAL PROGRAM PAPERS. [A67-29901 15-09]
Edited by A. A. Dougal.
New York, Institute of Electrical and Electronics Engineers, Inc., 1967, p. 10-5-1 to 10-5-8. 6 refs.

Analysis of the design and operation of a digital cardiotachometer. The design consists of a binary counter, a clock, logic which generates pulses dependent on the value currently in the counter, and several one-shot multivibrators which produce inhibit pulses of various lengths. A cycle of operation, which is repeated for each heart beat, is described. The instrument is characterized by an accuracy of greater than 1 beat/min and a range of 40 to 200 beats/min. At each beat of the heart, the time interval between that beat and the previous beat is converted to rate and presented on output lines in parallel binary form suitable for recording on digital magnetic tape. R.B.S.

A67-29947 #
THE MAN-MACHINE-ENVIRONMENTAL INTERFACE.
A. H. Schwichtenberg.
American Astronautical Society, Annual Meeting, 13th, Dallas, Tex., May 1-3, 1967, Paper 67-80. 7 p.
Members, $0.75; nonmembers, $1.50.

Optimal solution of man-made environmental interface problems in the framework of large-scale and long-term space operations. The effectiveness of man's activities in the space environment over time depends on further optimization of habitability, a term selected to encompass most essential elements of the man-machine environmental interface. The importance of conducting integrated systems engineering and systems trade-offs studies on a multidisciplinary basis is emphasized. Expected individual responses to the space environment are discussed. P.v.T.

A67-29963 #
LOCAL TRANSPORTATION IN COMMERCIAL SPACE OPERATIONS.
H. M. Graham (LTV Aerospace Corp., Missiles and Space Div., Dallas, Tex.).
American Astronautical Society, Annual Meeting, 13th, Dallas, Tex., May 1-3, 1967, Paper 67-116. 28 p.
Members, $0.75; nonmembers, $1.50.

Study of the anticipated evolution of extravehicular activity. This evolution is compared to the history of the development of earth transportation. The utilization of certain characteristics of the space environment, previously considered as hindrances, is discussed, taking into account such factors as vacuum, solar energy, radiation, and asteroids. R.B.S.

A67-30229 #
DYNAMICS OF PULSE WAVES OF INTRACRANIAL PRESSURE IN THE CASE OF TRANSVERSE OVERLOADS OF UP TO 40 g [DINAMIKA PUL'SOVYKH VOLN VNUTRICHEREPNOGO DAVLENIIA PRI POPERECHNYKH PEREGRUZKAKH DO 40 ED.].
Iu. E. Moskalenko, O. G. Gazenko, G. B. Vainshtein, and I. I. Kas'ian.
Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia, vol. 32, May-June 1967, p. 396-403. 25 refs. In Russian.

Experimental investigation of the dynamics of pulse waves of intracranial pressure at transverse accelerations ranging from 2 to 40 g, aimed at obtaining information of the peculiarities of the activity of the intracranial blood circulation system at such accelerations. It is found that accelerations on the order of 15 g act to decrease the amplitude of the waves. This decrease is attributed to a decrease in the stroke volume of the heart, so that the overall hemodynamic changes prevail over the disturbances in intracranial circulation. An increase in wave amplitude observed at accelerations in excess of 25 g is attributed to the prevailing effect of intracranial factors on the pulse-wave parameters. V.P.

A67-30315 * #
IDENTIFICATION OF HUMAN RESPONSE MODELS IN MANUAL CONTROL SYSTEMS.
Lawrence W. Taylor, Jr. (NASA, Flight Research Center, Edwards AFB, Calif.) and A. V. Balakrishnan (California, University, Los Angeles, Calif.).
IN: IDENTIFICATION IN AUTOMATIC CONTROL SYSTEMS; INTERNATIONAL FEDERATION FOR AUTOMATIC CONTROL, SYMPOSIUM, PRAGUE, CZECHOSLOVAKIA, JUNE 12-17, 1967, PREPRINTS. PART 1. [A67-30309 15-10]
Symposium sponsored by the Technical Committee on Theory of the International Federation for Automatic Control.
Prague, Academia, 1967, p. 1.7-1 to 1.7-8. 7 refs.

Frequency domain and time domain methods of analysis are reviewed with regard to their application toward identifying pilot models. The models would subsequently be used to study the stability and performance of a man-machine system in which the human controller performs a compensatory tracking task. Sample linear model results are compared and discussed. The inherent requirement constraining the freedom of the form of the pilot model is also discussed. The constraint in the frequency domain consists of smoothing with respect to frequency; whereas, the constraint for the time domain model is more natural and meaningful in that it consists simply of limiting the memory of the pilot model. The linear models determined by both methods were almost identical. The time domain method of analysis enables the determination of a nonlinear pilot

model. The inclusion of a cubic as well as a linear term accounted for only a small additional part of the pilot's remnant and indicated that only a small portion of the total power of the pilot's output is caused by nonlinearities. The power spectral density of an ensemble average of the pilot's outputs is used to determine the upper limit on the amount of power associated with a deterministic response. The indication is that about half the remnant is stochastic and only a small part is due to nonlinear and time-varying response for the example discussed. (Author)

A67-30355 #
A NEW APPROACH TO MEETING THE AIRLINE PILOT TRAINING REQUIREMENT.
Ralph E. Flexman (General Precision, Inc., General Precision Link Group, Binghamton, N.Y.).
American Institute of Aeronautics and Astronautics, Commercial Aircraft Design and Operation Meeting, Los Angeles, Calif., June 12-14, 1967, Paper 67-387. 9 p.
Members, $0.75; nonmembers, $1.50.

Review of airline pilot training programs. The weak points of these programs and the new avenues of approach which these weaknesses suggest are discussed. Present training procedures are analyzed with regard to pilot reliability, adaptability, decision making, work-load capacity, performance under stress, vigilance, and integrity. Greater use of flight simulators and advanced methods of pedagogy are suggested as means for the general improvement of pilot training. R.B.S.

A67-30356 #
IN-FLIGHT SIMULATION FOR TRAINING?
W. O. Breuhaus and G. Bull (Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.).
American Institute of Aeronautics and Astronautics, Commercial Aircraft Design and Operation Meeting, Los Angeles, Calif., June 12-14, 1967, Paper 67-388. 9 p. 15 refs.
Members, $0.75; nonmembers, $1.50.

Problems related to the training of pilots to fly future very-large, high-performance commercial transports are discussed. It is shown that both safety and economics make the development of more effective flight simulation devices very important. The complementary use of ground-based and in-flight simulation appears to offer a training system for these new aircraft which may better satisfy these requirements than do existing systems. Areas of possible application of inflight simulation are discussed. Contributions to the training of test pilots made by the use of variable-stability aircraft are also discussed. The latter are based upon a number of years of actual experience in this type of training. (Author)

A67-30366 #
DEVELOPMENTS ASSOCIATED WITH ADVANCED COMMERCIAL AIRCRAFT CREW REQUIREMENTS.
W. M. Magruder, J. A. Gorham, and R. F. Livingston (Lockheed Aircraft Corp., Lockheed-California Co., Burbank, Calif.).
American Institute of Aeronautics and Astronautics, Commercial Aircraft Design and Operation Meeting, Los Angeles, Calif., June 12-14, 1967, Paper 67-399. 9 p. 5 refs.
Members, $0.75; nonmembers, $1.50.

Examination of a systems-engineering approach to commercial aircraft crew requirements. Crew requirements, environmental conditions under which the crew must operate, special factors affecting crew performance, and the general influences on crew workload level are outlined. Development facilities and techniques used in the SST crew training program are discussed. The Lockheed engineering flight simulator, a flight simulator from Cornell Aeronautical Laboratories, the fog chamber from the University of California, and the SST flight station mockup are described. The major tasks in the development of the cockpit and associated systems are outlined. R.B.S.

A67-30631
THE ROLE OF EXTRAVEHICULAR SPACE MANEUVERING UNITS, MANNED AND UNMANNED, IN SATELLITE LABORATORY SYSTEMS.
G. M. Monroe (LTV Aerospace Corp., Astronautics Div., Dallas, Tex.).
IN: SPACE CRAFT SYSTEMS; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 1. [A67-30622 16-31]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 225-233.

Analysis of the design considerations of extravehicular maneuvering units in satellite laboratory systems. The basic functional characteristics of an astronaut maneuvering unit (AMU) and a remote maneuvering unit (RMU) are described. Fundamental space-flight requirements, such as relative trajectories, transfer mechanics, and the maneuvering-unit dynamics, are examined in relation to the maneuvering-unit development. A typical AMU configuration is analyzed in terms of the following component parts: (1) propulsion system; (2) attitude control system; (3) life support system; (4) communications system; (5) electrical power system; and (6) alarm display system. The importance of designing attitude control and propulsion systems with proper consideration of the center of gravity is underlined. Typical RMU and AMU configurations are described and contrasted. Integration of the extravehicular units with the satellite laboratory is considered. Tests conducted with these units are described, and environmental simulation is discussed. T.M.

A67-30751
LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7.
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966. 343 p.
In English, Russian, and French.
$16.

CONTENTS:

THE DYNAMICS OF THE OPHTHALMIC ARTERY IN HYPOXIA [LA DYNAMIQUE DE L'ARTERE OPHTALMIQUE EN HYPOXIE]. M. P. Popescu, M. Stefan, N. Cincă, I. Pintilie, and M. Stoian (Institut Medico-Pharmaceutique, Bucharest, Rumania), p. 51-61. 30 refs. [See A67-30757 16-04]

FLIGHT OF VOSKHOD 2 [POLET KOSMICHESKOGO KORABLIA "VOSKHOD-2"]. P. I. Beliaev (Ministerstvo Oborony SSSR, Moscow, USSR), p. 63-70. [See A67-30758 16-05]

FIRST WALK IN SPACE BY MAN [PERVYI VYKHOD CHELOVEKA V KOSMICHESKOE PROSTRANSTVO]. A. A. Leonov (Ministerstvo Oborony SSSR, Moscow, USSR), p. 71-77. [See A67-30759 16-05]

RESULTS OF SOME ELECTROPHYSIOLOGICAL INVESTIGATIONS ON BOARD THE SPACESHIP "VOSKHOD" [REZUL'TATY NEKOTORYKH ELEKTROFIZIOLOGICHESKIKH ISSLEDOVANII NA KORABLE "VOSKHOD"]. I. T. Akulinichov, V. V. Bogdanov, D. G. Maksimov, and I. I. Popov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR), p. 79-86. 8 refs. [See A67-30760 16-05]

PILOTED SIMULATORS FOR SPACE RESEARCH. A. W. Vogeley (NASA, Langley Research Center, Hampton, Va.), p. 87-104. [See A67-30761 16-11]

THE PROBLEM OF NORMALIZING NOISE PRODUCED BY LIFE-SUPPORT SYSTEMS IN SPACESHIP CABINS DURING PROLONGED FLIGHTS [K PROBLEME NORMIROVANIIA SHUMOV V KABINAKH KOSMICHESKIKH KORABLEI PRI DLITEL'NYKH POLETAKH]. E. M. Iuganov, Iu. V. Krylov, and V. S. Kuznetsov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR), p. 105-113. 20 refs. [See A67-30762 16-05]

PROBLEMS OF DIAGNOSTIC INFORMATION COLLECTION IN SPACE FLIGHT AS ONE OF THE MEDICAL CYBERNETICS TRENDS [PROBLEMA SBORA DIAGNOSTICHESKOI INFORMATSII V USLOVIIAKH KOSMICHESKOGO POLETA KAK ODNO IZ NAPRAVLENII MEDITSINSKOI KIBERNETIKI]. V. V. Parin and R. M. Baevskii (Ministerstvo Zdravookhraneniia SSSR, Moscow, USSR), p. 115-126. 24 refs. [See A67-30763 16-05]

THE PROBLEM OF VERIFYING THE PERMISSIBLE DOSES OF IONIZING RADIATION FOR SPACE-VEHICLE CREWS [PROBLEMA OBOSNOVANIIA DOPUSTIMYKH DOZ IONIZIRUIUSHCHEI RADIATSII DLIA CHLENOV EKIPAZHA KOSMICHESKIKH KORABLEI]. Iu. G. Grigor'ev, A. K. Gus'kova, M. P. Domshlak, V. G. Vysotskii, S. A. Raevskaia, B. A. Markelov, and N. G. Darenskaia (Ministerstvo Zdravookhraneniia SSSR, Moscow, USSR), p. 127-144. 73 refs. [See A67-30764 16-05]

THE TWO-GAS SPACECRAFT CABIN ATMOSPHERE ENGINEERING CONSIDERATIONS. J. L. Mason, J. N. Waggoner, and J. Ruder (Garrett Corp., Los Angeles, Calif.), p. 255-274. [See A67-30776 16-05]

SOME THEORETICAL ASPECTS OF THE CONSTRUCTION OF ARTIFICIAL ECOLOGICAL SYSTEMS [NEKOTORYE TEORETICHESKIE VOPROSY POSTROENIIA ISKUSSTVENNYKH EKOLOGICHESKIKH SISTEM]. A. B. Rubin and A. S. Fokht (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR), p. 275-281. [See A67-30777 16-05]

PROGRESS IN THE DEVELOPMENT OF "ACTIVE CHEMICALS" FOR USE AS AIR REVITALIZATION MATERIALS. A. W. Petrocelli (General Dynamics Corp., Groton, Conn.; Rhode Island, University, Kingston, R.I.), p. 283-299. 37 refs. [See A67-30778 16-05]

THE DESIGN OF RIGID, ARTICULATED PRESSURE SUITS. G. Fonda-Bonardi (Litton Industries, Inc., Beverly Hills, Calif.), p. 301-308. [See A67-30779 16-05]

QUESTIONS CONCERNING THE EVALUATION OF THE EFFICIENCY OF ASTRONAUTS (ACCORDING TO DATA OBTAINED FROM VOSKHOD 1 AND 2 FLIGHTS) [VOPROSY OTSENKI RABOTOSPOSOBNOSTI KOSMONAVTOV (PO MATERIALAM POLETOV "VOSKHOD-1, 2"]. P. K. Isakov, V. A. Popov, and L. S. Khachatur'iants (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR), p. 309-315. 8 refs. [See A67-30780 16-05]

ON AGREEMENT BETWEEN PREDICTED AND ACTUAL ENERGY COST INCURRED DURING THE OPERATION OF A SPACE SUIT SYSTEM. R. E. Breeding and R. Lang (United Aircraft Corp., Windsor Locks, Conn.), p. 317-337. [See A67-30781 16-05]

EVALUATION OF THE RADIATION ENVIRONMENT ON THE SURFACE OF THE MOON [OTSENKA RADIATSIONNOI OBSTANOVKI NA POVERKHNOSTI LUNY]. A. I. Vikhrov, V. E. Dudkin, E. E. Kovalev, and L. N. Smirennyi (Ministerstvo Zdravookhraneniia SSSR, Moscow, USSR), p. 339-343. 10 refs. [See A67-30782 16-29]

STATE OF REACTIVITY OF AN ORGANISM UNDER THE COMPLEX EFFECT OF SEVERAL SPACE FLIGHT FACTORS [SOSTOIANIE REAKTIVNOSTI ORGANIZMA PRI KOMPLEKSNOM VOZDEISTVII NEKOTORYKH FAKTOROV KOSMICHESKOGO POLETA]. V. V. Antipov, B. I. Davydov, E. F. Panchenkova, P. P. Saksonov, and G. A. Chernov, p. 145-161. 16 refs. [See A67-30765 16-04]

OBSERVATIONS CONCERNING MUTATION TO COSMIC RADIATION. J. Eugster, p. 163, 164. [See A67-30766 16-04]

NUCLEIC ACID AND THE IMPROBABILITY OF LIFE. A. E. Slater, p. 165-170. 6 refs. [See A67-30767 16-04]

MICROBIAL LIFE DETECTION BY MEASUREMENT OF PHYSICAL PARAMETERS. J. J. Konikoff (General Electric Co., Philadelphia, Pa.), p. 171-178. 13 refs. [See A67-30768 16-04]

OPHTHALMIC EFFECTS ASSOCIATED WITH IONIZING AND NONIONIZING ELECTROMAGNETIC RADIATION FIELDS. M. M. Zaret (Zaret Foundation, Inc., Scarsdale, N.Y.), p. 179-183. [See A67-30769 16-04]

THE PATHO-PHYSIOLOGY OF DECOMPRESSION SICKNESS - DYSBARISM. A. T. K. Cockett (Harbor General Hospital, Torrance, Calif.), R. M. Nakamura, and R. T. Kado (California, University, Los Angeles, Calif.), p. 185-189. 11 refs. [See A67-30770 16-04]

SPACE RESCUE - AN OPPORTUNITY FOR INTERNATIONAL COOPERATION IN SPACE. M. Stoiko (Martin Marietta Corp., Baltimore, Md.), p. 191-208. [See A67-30771 16-34]

PROBLEM OF THE POSSIBILITY OF CALCULATING THE HEAT EMISSION OF AN ORGANISM FROM PHYSICAL PARAMETERS [K VOPROSU O VOZMOZHNOSTI VYCHISLENIIA TEPLOOTDACHI ORGANIZMA PO FIZICHESKIM PARAMETRAM]. L. Novak (Chekhoslovatskaia Akademiia Nauk, Brno, Czechoslovakia), p. 209-222. 9 refs. [See A67-30772 16-05]

SOME ASPECTS OF THE THERAPY OF CARDIAC INSUFFICIENCY IN THE STATE OF SUBGRAVITY OR WEIGHTLESSNESS. C. Moutzithropoulos, p. 223-228. 13 refs. [See A67-30773 16-04]

ELECTROLYSIS-HYDROGENOMONAS BACTERIAL BIOREGENERATIVE LIFE SUPPORT SYSTEM. D. W. Jenkins (NASA, Washington, D.C.), p. 229-244. 25 refs. [See A67-30774 16-05]

SOME RESULTS OF PHYSIOLOGICAL-ECOLOGICAL INVESTIGATIONS OF CHLORELLA CULTURES AS A LINK IN A CLOSED ECOLOGICAL SYSTEM [NEKOTORYE ITOGI FIZIOLOGO-EKOLOGICHESKOGO ISSLEDOVANIIA KUL'TURY KHLORELLY KAK ZVENA ZAKRYTOI EKOLOGICHESKOI SISTEMY]. E. Ia. Shepelev (Akademiia Nauk SSSR, Moscow, USSR), p. 245-254. 24 refs. [See A67-30775 16-05]

A67-30752

PHYSIOLOGICAL REACTIONS OF MAN TO THE EFFECT OF OVERLOAD DURING SPACE FLIGHT [FIZIOLOGICHESKIE REAKTSII CHELOVEKA PRI VOZDEISTVII PEREGRUZOK VO VREMIA KOSMICHESKIKH POLETOV].

P. V. Vasil'ev and A. R. Kotovskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR).

(International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper.)

IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7. [A67-30751 16-05]

Congress supported by the United Nations Educational, Scientific and Cultural Organization.

Edited by Michał Łunc.

Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 1-14. 29 refs. In Russian.

A67-30753 *

HUMAN PERCEPTION OF LINEAR MOTION - A MATHEMATICAL MODEL OF THE OTOLITHS.

J. L. Meiry (Massachusetts Institute of Technology, Dept. of Aeronautics and Astronautics, Cambridge, Mass.).

(International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper.)
IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7. [A67-30751 16-05]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 15-26. 8 refs.
Grant No. NsG-577.

A67-30754
HEMODYNAMIC MODIFICATIONS PRODUCED BY POSTURE VARIATIONS - INFLUENCE OF THE ANTI-G SUIT AND OF TOURNIQUETS [MODIFICATIONS HEMODYNAMIQUES PRODUITES PAR LES VARIATIONS DE POSTURE - INFLUENCE DU COSTUME ANTI-G ET DES TOURNIQUETS].
Gr. Benetato, N. R. Zamfirescu, B. Felberg, S. Schiau, C. Teodorescu, I. Pintilie, and V. Filcescu (Académie Roumaine des Sciences, Institut de Physiologie Normale et Pathologique, Bucharest, Rumania).
IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7. [A67-30751 16-05]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 27-34.
16 refs. In French.

Study on a group of young subjects of modifications of (1) the cardiac frequency, (2) arterial pressure, and (3) central blood volume produced by passage from clinostatism to passive orthostatism. These modifications have been studied with and without an anti-g suit inflated to the level of diastolic pressure. It was noted that use of the anti-g suit attenuated certain reactions produced by orthostatism, such as increase of the cardiac frequency and reduction of the central blood volume. Application of tourniquets generally accentuated the hemodynamic modifications produced by orthostatism.
F. R. L.

A67-30755
REGIONAL BLOOD CIRCULATION DISORDERS IN HUMANS UNDER PROLONGED TRANSVERSE ACCELERATIONS [K VOPROSU O NARUSHENIIAKH REGIONARNOGO KROVOOBRASHCHENIIA U CHELOVEKA PRI DLITEL'NO DEISTVUIUSHCHIKH POPERECHNO NAPRAVLENNYKH USKORENIIAKH].
M. D. Emel'ianov and E. S. Kotova (Ministerstvo Zdravookhraneniia SSSR, Moscow, USSR).
IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7. [A67-30751 16-05]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 35-38. 14 refs. In Russian.

Outline of a medical test program for determining the effect of prolonged accelerations on the human organism by observations of the blood circulation in the retina. In addition to the usual vision test, the program includes a number of ophthalmodynamic tests and a campimetric examination of the blind spot. The results of some experiments on humans are discussed briefly.
V. Z.

A67-30756
RESULTS OF PRELIMINARY PHYSIOLOGICAL TESTING UNDER SIMULATED LUNAR AND MARTIAN GRAVITY CONDITIONS.
A. B. Hazard (USAF, Systems Command, Space Systems Div., Naval Field Office for Manned Orbiting Laboratory, Los Angeles, Calif.).
(AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, MANNED SPACE FLIGHT MEETING, 4TH, ST. LOUIS, MO., OCTOBER 11-13, 1965, TECHNICAL PAPERS, p. 296-302.)
IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7. [A67-30751 16-05]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 39-50.

A67-30757
THE DYNAMICS OF THE OPHTHALMIC ARTERY IN HYPOXIA [LA DYNAMIQUE DE L'ARTERE OPHTALMIQUE EN HYPOXIE].
M. P. Popescu, M. Stefan, N. Cincă, I. Pintilie, and M. Stoian (Institut Medico-Pharmaceutique, Chaire de Physiologie, Bucharest, Rumania).
IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7. [A67-30751 16-05]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 51-61.
30 refs. In French.

Angiodynamic study of the cephalic extremity in conditions of hypoxia as a means of furnishing information on the physiological limits of adaptation, and hence on the functional equilibrium of the eye with respect to the entire body. In dynamometry, the eye plays the role of a manometer; the circulatory modifications of the central retinal artery represent a gradation which indicates the equalization of pressure at this level and on a point situated above the papilla. Clinical researchers on 382 airmen under different conditions of hypoxia have shown a significant increase of pressure in the ophthalmic artery.
F. R. L.

A67-30758
FLIGHT OF VOSKHOD 2 [POLET KOSMICHESKOGO KORABLIA "VOSKHOD-2"].
P. I. Beliaev (Ministerstvo Oborony SSSR, Voenno-Vozdushnye Sily, Moscow, USSR).
(International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper.)
IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7. [A67-30751 16-05]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 63-70. In Russian.

A67-30759
FIRST WALK IN SPACE BY MAN [PERVYI VYKHOD CHELOVEKA V KOSMICHESKOE PROSTRANSTVO].
A. A. Leonov (Ministerstvo Oborony SSSR, Voenno-Vozdushnye Sily, Moscow, USSR).
(International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper.)
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VOLUME 7. [A67-30751 16-05]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 71-77. In Russian.

A67-30760
RESULTS OF SOME ELECTROPHYSIOLOGICAL INVESTIGATIONS ON BOARD THE SPACESHIP "VOSKHOD" [REZUL'TATY NEKOTORYKH ELEKTROFIZIOLOGICHESKIKH ISSLEDOVANII NA KORABLE "VOSKHOD"].
I. T. Akulinichev, V. V. Bogdanov, D. G. Maksimov, and I. I. Popov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR).
(International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper.)
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A67-30762
THE PROBLEM OF NORMALIZING NOISE PRODUCED BY LIFE-SUPPORT SYSTEMS IN SPACESHIP CABINS DURING PROLONGED FLIGHTS [K PROBLEME NORMIROVANIIA SHUMOV V KABINAKH KOSMICHESKIKH KORABLEI PRI DLITEL'NYKH POLETAKH].
E. M. Iuganov, Iu. V. Krylov, and V. S. Kuznetsov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR).
(International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper.)
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Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 105-113. 20 refs. In Russian.

A67-30763
PROBLEMS OF DIAGNOSTIC INFORMATION COLLECTION IN SPACE FLIGHT AS ONE OF THE MEDICAL CYBERNETICS TRENDS [PROBLEMA SBORA DIAGNOSTICHESKOI INFORMATSII V USLOVIIAKH KOSMICHESKOGO POLETA KAK ODNO IZ NAPRAVLENII MEDITSINSKOI KIBERNETIKI].
V. V. Parin and R. M. Baevskii (Ministerstvo Zdravookhraneniia SSSR, Moscow, USSR).
(International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper.)
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A67-30764
THE PROBLEM OF VERIFYING THE PERMISSIBLE DOSES OF IONIZING RADIATION FOR SPACE-VEHICLE CREWS [PROBLEMA OBOSNOVANIIA DOPUSTIMYKH DOZ IONIZIRUIUSHCHEI RADIATSII DLIA CHLENOV EKIPAZHA KOSMICHESKIKH KORABLEI].
Iu. G. Grigor'ev, A. K. Gus'kova, M. P. Domshlak, V. G. Vysotskii, S. A. Raevskaia, B. A. Markelov, and N. G. Darenskaia (Ministerstvo Zdravookhraneniia SSSR, Moscow, USSR).
(International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper.)
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A67-30765
STATE OF REACTIVITY OF AN ORGANISM UNDER THE COMPLEX EFFECT OF SEVERAL SPACE FLIGHT FACTORS [SOSTOIANIE REAKTIVNOSTI ORGANIZMA PRI KOMPLEKSNOM VOZDEISTVII NEKOTORYKH FAKTOROV KOSMICHESKOGO POLETA].
V. V. Antipov, B. I. Davydov, E. F. Panchenkova, P. P. Saksonov, and G. A. Chernov.
IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7. [A67-30751 16-05]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 145-161. 16 refs. In Russian.
Experimental investigation of the reaction of the organisms of mice, rats, and dogs to the complex effect of ionizing radiation, vibration, or acceleration. Tests showed that acceleration lasting from 30 min to 24 hr prior to irradiation with gamma rays, X rays, and high-energy protons in doses from 700 to 750 roentgens reduced mortality of the animals by 23% compared with irradiation without acceleration, while acceleration after irradiation under similar conditions reduced mortality by 8 to 12%. Tests in which mice were exposed to vibration 4 hr or 24 hr prior to irradiation at doses from 375 to 750 roentgens (X rays, gamma rays) and 1300 rad (protons) showed that mortality was reduced by 10 to 20% and the mean lifetime was increased by 10 to 40% as compared to irradiation without vibration. Possible mechanisms for the change in resistance to irradiation under the effect of dynamic factors are examined. V.P.

A67-30766
OBSERVATIONS CONCERNING MUTATION TO COSMIC RADIATION.
J. Eugster.
IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7. [A67-30751 16-05]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 163, 164.
Evaluation of observations concerning mutation of human tissue by cosmic radiation carried out on male and female experimental subjects at an altitude of 3500 m. Histological preparations including over 800 serial slices revealed a direct relationship between the rate of cell differentiation and increased cosmic radiation. An interesting phenomenon was the observation of reverse mutation at various loca-

tions. These were centers of concentrated precancerous tissue, which, during the first stage of an incipient malignancy, correlated with the highest density of nuclear tissue. T.M.

A67-30767
NUCLEIC ACID AND THE IMPROBABILITY OF LIFE.
A. E. Slater.
(International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper.)
IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7. [A67-30751 16-05]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
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Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 165-170.
6 refs.

A67-30768
MICROBIAL LIFE DETECTION BY MEASUREMENT OF PHYSICAL PARAMETERS.
J. J. Konfkoff (General Electric Co., Missile and Space Div., Re-Entry Systems Dept., Philadelphia, Pa.).
(International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper.)
IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7. [A67-30751 16-05]
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Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 171-178.
13 refs.

A67-30769
OPHTHALMIC EFFECTS ASSOCIATED WITH IONIZING AND NON-IONIZING ELECTROMAGNETIC RADIATION FIELDS.
M. M. Zaret (Zaret Foundation, Inc., Scarsdale, N.Y.).
(International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper.)
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Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 179-183.

A67-30770 *
THE PATHO-PHYSIOLOGY OF DECOMPRESSION SICKNESS - DYSBARISM.
A. T. K. Cockett (Harbor General Hospital, Dept. of Surgery/Urology, Torrance, Calif.), R. M. Nakamura, and R. T. Kado (California, University, School of Medicine, Space Biology Laboratory, Los Angeles, Calif.).
IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7. [A67-30751 16-05]
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Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 185-189.
11 refs.
Grant No. NsG-237-62.

Description of experiments designed to test the effectiveness of two therapeutic modalities upon mongrel dogs previously subjected to dysbarism by a moderate but lethal overcompression-decompression. The tests included infusion of plasma expanders to replace the calculated plasma volume loss and treatment by total body hypothermia alone for six hours. The method for the production of experimental dysbarism is outlined. Dextran and whole blood were used to correct the plasma deficit in the intravascular compartment. The results indicate that dextran infusion in the plasma-replacement therapy appears to be beneficial. Hypothermia appears to extend the limitations imposed by time in the decompression sickness. The mechanisms operating in dysbarism are described, but it is difficult to state categorically that hypothermia physically reduces the size of the bubbles. The treatment by hypothermia, however, appears to be useful and may be indicated when expert personnel are available. Recompression remains the treatment of choice. However, plasma-volume replacement using colloidal expanders is clearly indicated. T.M.

A67-30772
PROBLEM OF THE POSSIBILITY OF CALCULATING THE HEAT EMISSION OF AN ORGANISM FROM PHYSICAL PARAMETERS [K VOPROSU O VOZMOZHNOSTI VYCHISLENIIA TEPLOOTDACHI ORGANIZMA PO FIZICHESKIM PARAMETRAM].
L. Novak (Chekhoslovatskaia Akademiia Nauk, Institut Biofiziki, Brno, Czechoslovakia).
IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7. [A67-30751 16-05]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 209-222.
9 refs. In Russian.

Description of a method for calculating the heat emission and the equilibrium temperature of a homothermal organism by utilizing the given factors of the organism and its surrounding medium. Equations are derived for the thermal response of the organism in terms of the surrounding temperature, losses through breathing and conduction, body weight, and similar pertinent factors. A series of experiments is described which had the purpose of verifying the use of these equations. The experiments were conducted with white mice in the temperature range from 12.5°C to 37°C, and the measured results of temperature response were in close agreement with the predicted values. A table is presented listing similar measured and calculated results for other animals and for the human organism. The application of this method of equations in the field of bioastronautics is discussed. T.M.

A67-30773
SOME ASPECTS OF THE THERAPY OF CARDIAC INSUFFICIENCY IN THE STATE OF SUBGRAVITY OR WEIGHTLESSNESS.
C. Moutzithropoulos.
IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7. [A67-30751 16-05]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 223-228.
13 refs.

Theoretical analysis of the effects of weightlessness on the human cardiovascular system. The three principal types of mechanical forces are analyzed in terms of the weightless state. The

effects of this state on the response of the cardiovascular system and associated changes in the neuromuscular reflexes and the autonomous nervous system are discussed in relation to the dynamic equilibrium of the circulatory system at normal conditions. The resistance to flow is found to change under different external force applications. Gravitational forces lead to the redistribution of the blood volume, due to the development of considerable hydrostatic pressure in the circulatory system. The amount of work done in overcoming this pressure is calculated from the elementary laws of hydraulics and mechanics of fluids. The reduction in mechanical efficiency of the myocardial contraction is examined. A method of cardiac-insufficiency therapy using controllable gravity environments is discussed. Several problems which may be encountered in this method are listed. T.M.

A67-30774 *
ELECTROLYSIS-HYDROGENOMONAS BACTERIAL BIOREGENERATIVE LIFE SUPPORT SYSTEM.
D. W. Jenkins (NASA, Washington, D.C.).
(International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper.)
IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7. [A67-30751 16-05]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 229-244.
25 refs.

A67-30775
SOME RESULTS OF PHYSIOLOGICAL-ECOLOGICAL INVESTIGATIONS OF CHLORELLA CULTURES AS A LINK IN A CLOSED ECOLOGICAL SYSTEM [NEKOTORYE ITOGI FIZIOLOGO-EKOLOGICHESKOGO ISSLEDOVANIIA KUL'TURY KHLORELLY KAK ZVENA ZAKRYTOI EKOLOGICHESKOI SISTEMY].
E. Ia. Shepelev (Akademiia Nauk SSSR, Otdelenie Biologii, Moscow USSR).
(International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper.)
IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7. [A67-30751 16-05]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 245-254.
24 refs. In Russian.

A67-30776
THE TWO-GAS SPACECRAFT CABIN ATMOSPHERE ENGINEERING CONSIDERATIONS.
J. L. Mason, J. N. Waggoner, and J. Ruder (Garrett Corp., AiResearch Manufacturing Co., Los Angeles, Calif.).
(International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper.)
IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7. [A67-30751 16-05]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 255-274.

A67-30777
SOME THEORETICAL ASPECTS OF THE CONSTRUCTION OF ARTIFICIAL ECOLOGICAL SYSTEMS [NEKOTORYE TEORETICHESKIE VOPROSY POSTROENIIA ISKUSSTVENNYKH EKOLOGICHESKIKH SISTEM].
A. B. Rubin and A. S. Fokht (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR).
(International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper.)
IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7. [A67-30751 16-05]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 275-281. In Russian.

A67-30778
PROGRESS IN THE DEVELOPMENT OF "ACTIVE CHEMICALS" FOR USE AS AIR REVITALIZATION MATERIALS.
A. W. Petrocelli (General Dynamics Corp., Electric Boat Div., Research and Development Dept., Chemical Engineering Section, Groton, Conn.; Rhode Island, University, Kingston, R.I.).
IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7. [A67-30751 16-05]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 283-299.
37 refs.

Survey of recent progress in the development of multifunctional chemical compounds for use as air revitalization materials. The research goal in this area is to develop a single chemical compound which will supply breathing oxygen, remove carbon dioxide, deodorize the atmosphere, remove toxic atmospheric contaminants, and destroy the airborne bacteria in the atmosphere. A brief summary is presented of the availability of superoxides, ozonides, and peroxides. The air revitalization chemistry of sodium superoxide, potassium superoxide, and lithium peroxide is discussed. Weight and volume characteristics of the superoxides are analyzed in relation to an extended space mission. Actual engineering studies of active chemical systems are reviewed. Earlier programs utilizing potassium superoxide for atmosphere control are described, and improved engineering practices in the design of such systems are examined. Equipment used by the Vostok and Voskhod satellites is analyzed. T.M.

A67-30779 *
THE DESIGN OF RIGID, ARTICULATED PRESSURE SUITS.
G. Fonda-Bonardi (Litton Industries, Inc., Applied Research Space Laboratories, Beverly Hills, Calif.).
(International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper.)
IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS.

VOLUME 7. [A67-30751 16-05]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 301-308.
Contract No. NAS 9-1278.

A67-30780

QUESTIONS CONCERNING THE EVALUATION OF THE EFFICIENCY OF ASTRONAUTS (ACCORDING TO DATA OBTAINED FROM VOSKHOD 1 AND 2 FLIGHTS) [VOPROSY OTSENKI RABOTOSPOSOBNOSTI KOSMONAVTOV (PO MATERIALAM POLETOV "VOSKHOD-1, 2")].

P. K. Isakov, V. A. Popov, and L. S. Khachatur'iants (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR).

IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7. [A67-30751 16-05]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 309-315.
8 refs. In Russian.

Evaluation of the experimental results concerning the operational efficiency of astronauts. Tests were performed during the Voskhod 1 and 2 flights involving the following problems: (1) an analysis of the efficiency of manual operations; (2) study of the resolution of the visual analyzer; (3) evaluation of the efficiency of the memory; and (4) study of the characteristics of movement outside of the spacecraft. The results of manual operations performed by astronauts Komarov and Jegorov indicate an increase in the time required to perform various operations during the first few orbits; however, the time required for completion of assigned operations diminishes as the flight progresses. Tests with the visual analyzer indicate only insignificant variations during flight. Memory response appears to have more regularity during secondary orbits. The results of simulated flight control tests during flight are described. The biomechanical effects of movement by astronaut Leonov outside the spacecraft are discussed in terms of the pulse rate during exertion.
T.M

A67-30781

ON AGREEMENT BETWEEN PREDICTED AND ACTUAL ENERGY COST INCURRED DURING THE OPERATION OF A SPACE SUIT SYSTEM.

R. E. Breeding and R. Lang (United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.).

IN: LIFE IN SPACE CRAFT; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 7. [A67-30751 16-05]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 317-337.

Description of a method employed to predict and measure the metabolic energy cost involved in operating a space suit system. The method has been developed for determining the metabolic load of a subject in a space suit. The procedure is based on determining the metabolic load as a function of CO_2 production and oxygen consumption rates and uses a Tissot gasometer modified for spirometry by the use of a Baralyme bed to absorb CO_2. The procedure is usable during periods of high activity in a 100% oxygen environment at any suit pressure ranging from 3.7 to 20 psia. There has been good agreement between measured and predicted metabolic loads generated during design point missions. During the described manned testing, a liquid cooling garment was used to prevent sweating of the test subject. The tests demonstrated that the design of the garment was satisfactory and that the coolant stream, by virtue of its flow rate and temperature, accomplished its intended function.
T.M.

A67-30788

THE ROLE OF CYBERNETICS IN BIOASTRONAUTICS.

C.-J. Clemedson (Göteborg, Universitet, Göteborg, Sweden).

(International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper.)
IN: ASTRONAUTICS AND EDUCATION; INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 16TH, ATHENS, GREECE, SEPTEMBER 13-18, 1965, PROCEEDINGS. VOLUME 8. [A67-30783 16-34]
Congress supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by Michał Łunc.
Paris, Gauthier-Villars, Dunod; New York, Gordon and Breach; Warsaw, Państwowe Wydawnictwo Naukowe, 1966, p. 63-70. 25 refs.

A67-30901 #

RADIATION AND SPACE FLIGHTS [RADIATSIIA I KOSMICHESKIE POLETY].

Iu. G. Grigor'ev, E. E. Kovalev, and V. N. Pravetskii.

Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 3-6. In Russian.

Study of the extreme factors which men will encounter in space flight, dealing particularly with the danger of cosmic radiation. Specific systems for the protection of spacecraft crews are now under consideration. The hazard of the earth's radiation belts is noted, and it is observed that further research on the biological effects of ionizing radiation on the human body is needed. The use of radiation warning devices and of drugs for radiation protection is considered.
P.v.T.

A67-30902 #

PROBLEMS OF AUTOMATION OF OPERATIVE MEDICAL CONTROL IN SPACE FLIGHT [PROBLEMY AVTOMATIZATSII OPERATIVNOGO VRACHEBNOGO KONTROLIA V KOSMICHESKOM POLETE].

B. B. Egorov, A. D. Egorov, A. A. Kiselev, and I. S. Shadrintsev.

Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 7-14. 5 refs. In Russian.

Discussion of problems of automation of operative medical control with the aid of onboard and ground computers. Equations of models of changes in physiological indices involving various flight factors are given. The application of analytical methods (analyses of variance, or regression, of covariance) makes it possible not only to establish changes in physiological indices, but also to reveal the factor or factors causing the changes.
P.v.T.

A67-30903 #

TRENDS IN THE DEVELOPMENT OF SPACE PSYCHOLOGY [PUTI RAZVITIIA KOSMICHESKOI PSIKHOLOGII].

B. S. Aliakrinskii.

Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 14-21. 42 refs. In Russian.

Investigation of man's psychological reactions to the problems of space flight. The effects that weightlessness, immobility, and confinement to a small space have on a cosmonaut's well-being and on his ability to carry out a mission are considered. Psychological testing of would-be cosmonauts is strongly recommended.
P.v.T.

A67-30904 #
A STUDY OF THE CUMULATIVE EFFECT OF IMPACT ACCELERATION [ISSLEDOVANIE KUMULIATIVNOGO DEISTVIIA UDARNYKH PEREGRUZOK].
S. A. Gozulov, N. P. Morozova, and V. A. Elivanov.
Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 22-26. 8 refs. In Russian.

Account of experiments performed on rats to study the cumulative effect of impact accelerations of 600 g revealed by postmortem examinations. The accelerations were applied at different rates and subcritical landing velocities. The cumulative lesions resulting from repeated exposures at 1-hr intervals were detected to result in a primary lesion of the lungs, similarly to the effect of a single exposure at supercritical velocities. Lesions developed after a comparatively small number of repeated exposures (3 to 5) for a wide range of subcritical velocities (7 to 4 or 5 m/sec.). The aftereffect period lasts for 24 hr and is related to reactive changes in individual organs. P.v.T.

A67-30905 #
OXYGEN METABOLISM IN AN ORGANISM EXPOSED TO PROLONGED ACCELERATIONS [NEKOTORYE STORONY KISLORODNOGO OBMENA ORGANIZMA PRI DLITEL'NO DEISTVUIUSHCHIKH USKORENIIAKH].
E. I. Sorokina.
Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 26-30. 9 refs. In Russian.

Description of changes in oxygen metabolism of muscular and brain tissues of animals exposed to prolonged transverse accelerations (oxygen tension and redox potential). The total oxygen consumption and body temperature under the same conditions are examined. A many-faceted approach to the processes studied makes it possible to establish new regularities in oxygen metabolism of muscular and brain tissues. Evaluation of these regularities is an aid to understanding of the role of the changes for the tolerance of the body to accelerations in general. P.v.T.

A67-30906 #
THE EFFECT OF HYPOXIA ON THE CELLULAR AND HUMORAL IMMUNITY OF MICE [VLIIANIE GIPOKSII NA KLETOCHNYI I GUMORAL'NYI IMMUNITET U MYSHEI].
A. S. Kaplanskii, G. N. Durnova, and N. A. Roshchina.
Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 31-35. 24 refs. In Russian.

Study of the effect of hypoxia on the protective mechanisms of an animal. For this purpose, mice were exposed to air at 378 mm Hg (equivalent to an altitude of 5500 m) for 20 days. Hypoxia was shown to increase the animal's sensitivity to bacterial infection (S. typhi) and to inhibit the cell immunity (the phagocytic activity of neutrophils and macrophages decreased). The production of antibodies and the development of hyperplasia of the cell plasma in lymph nodes were not disturbed at the given atmospheric pressure. Hypoxia led to hypoplasia of the lymphoid tissue, and the lymphocytic cells disappear for the most part. P.v.T.

A67-30907 #
OBJECTIVE EVALUATION OF THE REACTIVITY OF AN ORGANISM [K VOPROSU OB'EKTIVNOI OTSENKI REAKTIVNOSTI ORGANIZMA].
L. Novak.
Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 35-38. In Russian.

Research on the reaction of a subject to applied stimuli, showing that this reaction usually results in metabolic changes. The scattering of the physiological parameters is often very pronounced, and an adequate quantitative estimation of the small differences in the reactions of the test subject is often overlooked. A new method for the objective evaluation of the subjects metabolism is developed. The method is based on a comparison of the value measured with that calculated for the biophysical model of the function studied. This model includes the factors which can affect the value of the function measured. The observed difference between the calculated and the measured values reflects changes in the regulatory mechanisms of the subject, changes caused by other factors being included in the calculated value of the biophysical model. P.v.T.

A67-30908 #
BIOLOGICAL VALUE OF PLANT PROTEINS IN RELATION TO THEIR UTILIZATION IN A CLOSED LIFE-SUPPORT SYSTEM [IZUCHENIE BIOLOGICHESKOI TSENNOSTI RASTITEL'NYKH BELKOV V SVIAZI S VOZMOZHNYM ISPOL'ZOVANIEM IKH V BIOLOGICHESKOI SISTEME ZHIZNEOBESPECHENIIA].
N. S. Kliushkina, V. I. Fofanov, and I. T. Troitskaia.
Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 38-43. 8 refs. In Russian.

Study of the effect upon an animal organism of diets which included proteins of unicellular green algae or soya as the only protein source. This effect was studied on two generations of white rats. It was found that algae protein had a relatively high biological value compared to a casein diet. The offspring of the test animals appeared to be more vital than the offspring of the control rats. The biological value of soya protein was significantly lower than that of the algae. P.v.T.

A67-30909 #
PHYSIOLOGICAL REGENERATION ON THE EPITHELIUM OF THE CORNEA AND INTESTINES EXPOSED TO FRACTIONAL IRRADIATION WITH FISSION NEUTRONS [FIZIOLOGICHESKAIA REGENERATSIIA EPITELIIA ROGOVITSY I KISHECHNIKA V USLOVIIAKH FRAKTSIONIROVANNOGO OBLUCHENIIA NEITRONAMI DELENIIA].
V. M. Mastriukova and A. D. Strzhizhovskii.
Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 43-47. 9 refs. In Russian.

Study of the mitotic index and content of chromosome aberrations in the epithelial cells of mice. The animals were exposed to fractional irradiation with fission neutrons at doses of 50, 125 and 500 rad/week. Under these conditions, compensatory processes increasing the tissue resistance to further irradiations developed in the epithelium of the cornea and intestines. This indicated an increase in damage to the cell's genetic structure, affecting mitotic activity. Hence, tissues developed a state of equilibrium having characteristics dependent on the dosage given. P.v.T.

A67-30911 #
EXTREME FACTORS OF LONG-TERM SPACE FLIGHT AND HEALTH CONDITION REQUIREMENTS FOR THE CREW MEMBERS OF SPACECRAFT [EKSTREMAL'NYE FAKTORY DLITEL'NOGO KOSMICHESKOGO POLETA I TREBOVANIIA K SOSTOIANIIU ZDOROV'IA CHLENOV EKIPAZHEI KOSMICHESKIKH KORABLEI].
P. V. Buianov and V. G. Terent'ev.
(Mezhdunarodnyi Kongress po Aviatsionnoi i Kosmicheskoi Meditsine, 15th, Prague, Czechoslovakia, Sept. 27, 1966, Paper.)
Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 52-54. 13 refs. In Russian.

Survey of the effects of prolonged space flight on the health of crew members together with a discussion of crew-member selection. The effects of acceleration and deceleration, prolonged lack of gravity, and extended hypokinesia on the human organism are discussed. Requirements to the health conditions of candidates should be based on the effects of these space flight factors on the human body and its tolerance limits. Since most people have certain characteristics of the body which determine its functional limits, tests should be based on tolerance response to provocative tests such as accelerations, physical strain, orthostatic tests, and oxygen starvation. T.M.

A67-30912 #
A STUDY OF THE STATES OF ACTIVITY OF A GROUP OF SUBJECTS CONTAINED IN CONDITIONS OF RELATIVE ISOLATION [IZUCHENIE REZHIMOV ZHIZNEDEIATEL'NOSTI GRUPPY ISPYTATELEI, NAKHODIASHCHIKHSIA V USLOVIIAKH OTNOSITEL'NOI IZOLIATSII].
N. N. Gurovskii, B. A. Dushkov, and F. P. Kosmolinskii.
Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 54-59. 6 refs. In Russian.

Analysis of two 15-day experiments for the study of three subjects performing specified work-rest cycles in an isolation chamber. The experiments were performed in a sealed chamber having a volume of 23 m^3, (air space 15 m^3), and constructed of metal. Noise level was kept below 60 db and the illumination of work areas was 100 lux. Temperature was kept below 25°C, humidity at 60%, oxygen

level approximately 25%, and carbon dioxide between 0.55 and 0.8%. The group consisted of two physicians and one technician between 25 and 30 years of age. The subjects were exposed to two 15-day periods in the chamber: (1) a 24-hr regime with distributed periods of activity consisting of 8 hr sleep, and alterning 4-hr periods of work and rest; (2) an 18-hr regime with 6 hr sleep and 3-hr work periods. The latter cycle had a greater effect on the psychological functions, cardiovascular system, and nervous and muscular activity. It also caused more biochemical changes indicating the development of nervous and emotional strain of the test subjects. T.M.

A67-30913 #

STUDY OF SLEEP CHARACTERISTICS DURING CONDITIONS SIMULATING SPACE FLIGHT [IZUCHENIE OSOBENNOSTEI SNA V UZLOVIIAKH, MODELIRUIUSHCHIKH KOSMICHESKII POLET].

V. I. Miasnikov.

Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 59-63. 5 refs. In Russian.

Description of the characteristics of sleep during the influence of various factors of space flight. A series of approximately 300 experiments was performed on a group of subjects ranging from 21 to 40 years of age during their natural night sleep. The subjects were subjected to noise, angular accelerations, and isolation. Study of the complex psychophysiological characteristics of sleep was conducted by interrogation of the subject and his subjective evaluation of the quality of his sleep, by measuring the bioelectrical activity of the brain, by observation of the subject's movements, and by measuring the depth of sleep. The experiments have demonstrated the role of environmental factors in impairing sleep quality; the results included difficult vigilance-sleep transition and superficial sleep. They have also shown the effect of sleep on the recovery from functional changes. The significance of somnolent, precollaptoid, and fatigue states is analyzed. T.M.

A67-30914 #

CHANGE OF HUMAN MOTION COORDINATION DURING LONG CONFINEMENT IN A CHAMBER OF SMALL VOLUME [IZMENENIE KOORDINATSII DVIZHENII CHELOVEKA PRI DLITEL'NOM PREBYVANII EGO V KAMERE MALOGO OB'EMA].

B. A. Dushkov.

Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 64-70. 8 refs. In Russian.

Evaluation of tests performed for the purpose of describing the effects of prolonged confinement on the biodynamic processes of walking and other specific movements in special positions. The subjects were confined in chambers of limited volume for 17 and 19-day periods. The observation of specially selected exercises before and after the confinement was conducted in four basic positions of the subject.. Prolonged hypodynamia was shown to disturb the cyclic interaction of structures involved in the motor act and to impair the coordination of the biodynamic elements in the neuromotor apparatus. T.M.

A67-30915 #

INFLUENCE OF SOME EXTREME EFFECTS ON THE FUNCTIONAL STATE OF THE STOMACH [VLIIANIE NEKOTORYKH EKSTREMAL'NYKH VOZDEISTVII NA FUNKTSIONAL'NOE SOSTOIANIE ZHELUDKA].

P. I. Egorov, K. V. Smirnov, M. M. Korotaev, and M. V. Lukasheva.

Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 71-74. 6 refs. In Russian.

Analysis of the effects of accelerations and hypokinesia on the functional state of the human stomach. Consideration was devoted to the rate of secretion of the gastric juices. The experiments were performed on 5 male subjects between the ages of 23 and 36. The subjects were exposed twice to accelerations of 11.9 to 14.5 g within an interval of 4 to 6 days. After the exposures the subjects remained in the state of hypokinesia for 2 months. They were then again subjected to accelerations of 11 to 16 g. The exposure to accelerations has been shown to inhibit the secretory and enzyme-forming gastric functions. The acidity of the intestinal juice showed a tendency to rise. The effects of hypokinesia produced further limitation of the secretory processes. T.M.

A67-30916 #

CHANGES OF WATER-SALT METABOLISM UNDER CONDITIONS OF 62-DAY HYPOKINESIS [IZMENENIE VODNO-SOLEVOGO OBMENA V USLOVIIAKH 62-SUTOCHNOI GIPOKINEZII].

E. N. Biriukov, L. I. Kakurin, G. I. Kozyrevskaia, Iu. S. Koloskova, Z. P. Paek, and S. V. Chizhov.

Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 74-79. 12 refs. In Russian.

Analysis of the changes in water-salt metabolism during a 62-day confinement in bed following exposure to accelerations of 13 to 15 g. The tests were performed on 6 young men. The diet consumed by the subjects provided 3000 to 5000 cal/day. The amount of water consumed, urine excreted, and the diuresis rate were investigated. The electrolytic composition of the urine, feces, and blood was determined. The bed rest resulted in a decrease of water consumption, a change of the diuresis rate, and a shift of the electrolytic composition of the urine and feces. The changes occurred in two phases. The first period of reconstruction covered 3 to 4 weeks and the following period consisted of relative stabilization of the metabolism at a level adequate to the new conditions. Peculiarities of the changes revealed in the water-salt metabolism indicate the development of dehydration and decalcification. T.M.

A67-30917 #

EFFECT OF NOISE AND VIBRATION ON THE MENTAL WORK CAPACITY OF A MAN UNDER CONDITIONS OF LIMITED TIME [VLIIANIE VIBRATSII I SHUMA NA UMSTVENNUIU RABOTOSPOSOBNOST' CHELOVEKA V USLOVIIAKH DEFITSITA VREMENI].

K. K. Ioseliani.

Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 79-82. 5 refs. In Russian.

Analysis of experiments performed for the purpose of measuring the effect of vibration and noise on the human mental capacity when time is limited. Sixty subjects in the age group from 25 to 45 years were tested. The experiment consisted of performing the addition and subtraction of numbers presented at varying speeds. The subjects performed continuous calculation at a given rate under the influence of noise and vibration. The influence of total vertical vibrations, at a frequency of 70 cps and with an amplitude of 0.4 mm, reduces the average performance efficiency by as much as 1.5 to 2 times. The effect of noise at 90 db cuts the average performance in half. The greatest reduction in efficiency has also been shown to increase with increased time limitation. T.M.

A67-30918 #

NYCTOMETRY DURING THE STUDY OF THE EFFECTS OF VESTIBULAR IRRITATION ON DARK ADAPTATION [NIKTOMETRIIA PRI IZUCHENII VLIIANIIA VESTIBULIARNOGO RAZDRAZHENIIA NA TEMNOVUIU ADAPTATSIIU].

T. A. Petrova, M. P. Kuz'min, I. Ia. Iakovleva, and V. P. Baranova.

Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 82-86. 19 refs. In Russian.

Description of tests performed on the effects of irritation of the vestibular apparatus on the adaptability of the human eye to darkness. The effect of the vestibular irritation on the rate of recovery of the sharpness of vision during darkness adaptation was studied. The recovery rate and the susceptibility of the eye to temporary blindness were registered by means of a nyctometer apparatus after 3-min exposures to strong light. The OR_{10} test was used as a vestibular stimulus. The tests were performed on 50 healthy subjects and have significance in determining the effects experienced by astronauts during orbital flight. Changes in the rate of adaptation are described with respect to the vestibular tolerance. High tolerance was found to accelerate adaptation and low tolerance to hinder it. The possibility of specific interaction of the vestibular and optic analyzers is demonstrated. T.M.

A67-31000
BIOPHYSICAL RESEARCH IN SPACE FLIGHTS. I [BIOPHYSIKALISCHE FORSCHUNGEN BEIM RAUMFLUG. I].
Horst Bücker (Frankfurt, Universität, Frankfurt, West Germany).
VDI Zeitschrift, vol. 109, no. 16, 1967, p. 709-711. In German.

Brief discussion concerning the effects of several classes of space-environment factors on the living organism. The effects due to changing gravity are tabulated, and the dangers and opportunities for biological study offered by high vacuums and solar radiation are investigated. It is pointed out that the intensity of UV radiation in space, being of greater magnitude there than on earth, will enable researchers to conduct valuable radiation experiments on living organisms. R.B.S.

A67-31472 #
CORRELATION BETWEEN MAXIMUM AEROBIC WORK AND ANTHROPOMETRIC AND SPIROMETRIC PARAMETERS [RELAZIONE FRA IL MASSIMO LAVORO AEROBICO E I PARAMETRI ANTROPOMETRICI E SPIROMETRICI].
S. Hatzikonstantinou, E. Economides (Atene, Università, Clinica Propedeutica Patologica, Athens, Greece), D. Papanastassiou, and A. Liari (Atene, Università, Hospedale "King Paul", Laboratorio Ergospirometrico, Athens, Greece).
Rivista di Medicina Aeronautica e Spaziale, vol. 30, Jan.-Mar. 1967, p. 9-22. 18 refs. In Italian.

Examination of seventy track athletes and oarsmen to determine maximum aerobic work by means of two phases of submaximum work on a bicycle ergometer. Maximum aerobic work values were correlated with anthropometric data (body weight, height, and surface) and spirometric data (vital capacity, maximum ventilatory capacity, and apnea time in air and oxygen), and the ventilatory capacity was studied. It is concluded that anthropometric and spirometric data of normal subjects are not indicative parameters for calculating the theoretical values of maximum aerobic work. The importance of using parameters of circulatory functions is stressed. P.v.T.

A67-31473 #
HISTOPHYSIOLOGICAL STUDY OF PULMONARY CIRCULATION OF RABBITS SUBJECTED TO ACUTE HYPERBARIC OXYGENATION AT 3 ATMOSPHERES ABSOLUTE [OSSERVAZIONI ISTO-FISIOLOGICHE SUL CIRCOLO POLMONARE DEL CONIGLIO SOTTOPOSTO AD OSSIGENAZIONE IPERBARICA ACUTA A 3 ATMOSFERE ASSOLUTE].
C. Vacca (Napoli, Università, Istituto di Fisiologia Generale e Speciale degli Animali Domestici e Chimica Biologica, Naples, Italy), F. Rosati (Napoli, Università, Istituto di Anatomia degli Animali Domestici con Istologia ed Embriologia, Naples, Italy), and L. Vacca (Napoli, Aeronautica Militare, Istituto Medico-Legale "G. Gradenico", Naples, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 30, Jan.-Mar. 1967, p. 23-40. In Italian.

Histological study showing that hyperbaric oxygenation produces changes in the bronchial epithelium and frequent loss of the mucous-membrane epithelium. Mild changes are reported in the alveolar epithelium. In the pulmonary tissues lymphocytic infiltration areas are frequently observed. The arterial pulmonary tree shows a clear vasoconstriction. Microphotographs show that the capillary flow regulation is performed by an arterial muscular apparatus, which can change the blood flow in precapillary sinuses. P.v.T.

A67-31474 #
DANGERS OF PILOTS' SELF-MEDICATION - DRUGS WHICH ARE APT TO ENDANGER A PILOT'S FLIGHT ACTIVITIES AND ARE OFTEN TAKEN WITHOUT MEDICAL ADVICE [I PERICOLI DELL'AUTOTERAPIA NEL PILOTA - FARMACI CHE POSSONO CONTROINDICARE L'ATTIVITA' DI VOLO E DI CUI E' PIU' FREQUENTE L'ASSUNZIONE SENZA CONSIGLIO MEDICO].
G. Valletta (Roma, Università, Scuola di Specializzazione in Medicina Aeronautica et Spaziale, Rome, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 30, Jan.-Mar. 1967, p. 54-88. 31 refs. In Italian.

Survey of the occupational pathology of flight personnel inducing self-medication. The drugs chiefly used in self-medication are discussed and classified, according to their pharmacological action, and their dangerous effects on pilot performance in flight are studied. Some cases of dangerous self-medication in flight are reported. In conclusion, the necessity of controlling such medication by the proper medical authorites is stressed. P.v.T.

A67-31475 #
RESEARCH ON THE CONCENTRATION OF CONTAMINANTS CONTAINED IN THE LIQUID BREATHING OXYGEN IN AIRCRAFT CONVERTERS [INDAGINE SULLA CONCENTRAZIONE DEGLI INQUINANTI DELL'OSSIGENO LIQUIDO AVIO NEI CONVERTITORI DI BORDO].
V. Iannetti and G. Pecci (Roma, Laboratorio Chimico Tecnologico, Rome, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 30, Jan.-Mar. 1967, p. 89-103. In Italian.

Determination of the degree of contaminant concentration in the onboard converter of the F 104 G aircraft in the whole operating cycle (25 refillings) by controlling the concentration process in each intermediate phase. Oxygen analyses were carried out by means of gas chromatography, using an apparatus equipped with thermistors and flame-ionizing detectors. Action is suggested by competent authorities to specify the concentration of contaminants bearable to man during flights, as well as the harmful effects due to the presence of such substances. P.v.T.

A67-31476 #
CLOTHING HYGIENE WITH PARTICULAR REFERENCE TO AEROSPACE PROBLEMS. III [L'IGIENE DEL VESTIARIO CON PARTICOLARE RIFERIMENTO AI PROBLEMI AEROSPAZIALI. III].
E. Sulli (Roma, Università, Istituto di Igiene, Rome, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 30, Jan.-Mar. 1967, p. 105-161. 49 refs. In Italian.

Study of protective garments required to shield the individual from noxious agents inherent in a space environment to enable him to work efficiently. The characteristics of the more important garments offering protection in flight are examined, with particular emphasis on the best known fireproofing methods. Moreover, various skin diseases traceable to the wearing of certain garments are considered, as well as the influence of such diseases on the general health of the individual affected. In conclusion, methods of disinfection and disinfestation of garments and fabrics are studied, with due consideration to their effectiveness. P.v.T.

A67-31538
MEDICAL ASPECTS OF THE GEMINI FLIGHTS AND THE APOLLO ACCIDENT [ASPECTS MEDICAUX DES VOLS GEMINI ET DE L'ACCIDENT APOLLO].
L. Tabusse and F. Violette (Centre d'Enseignement et de Recherche de Médecine Aéronautique, Service de Santé /Air/, France).
Forces Aériennes Françaises, vol. 21, June 1967, p. 829-854. In French.

Discussion of the medicophysiological aspects of the NASA "Man in Space" program. The details of the medicophysiological control of astronauts before, during, and after the flights are outlined, together with the medical experiments under actual flight conditions, aimed at finding solutions to specific problems associated with space environment. Particular attention is given to cardiovascular, muscular, and osseous effects and to indications on the state of vestibular apparatus, sense of orientation and acuteness of vision in space. The reasons for the choice by NASA specialists to use pure oxygen for the Apollo cabin atmosphere are noted, together with some of the safety measures on which these specialists relied. V.P.

A67-31611
SOME DATA ON THE CONDITION OF COSMONAUTS DURING THE FLIGHT OF THE "VOSKHOD" SPACESHIP.
Iu. M. Volynkin, I. T. Akulinichev, P. V. Vasil'ev, A. D. Voskresenskii, I. I. Kas'ian, and D. G. Maksimov.
(Kosmicheskie Issledovaniia, vol. 4, Sept.-Oct. 1966, p. 755-767.)
Cosmic Research, vol. 4, Sept.-Oct. 1966, p. 656-665. 11 refs.
Translation.

A67-31612
A METHOD OF PROGRAMMED PHYSIOLOGICAL MEASUREMENTS AND EXPERIENCE IN ITS USE ON THE "VOSKHOD" SPACESHIP.
R. M. Baevskii and D. G. Maksimov.
(Kosmicheskie Issledovaniia, vol. 4, Sept.-Oct. 1966, p. 768-780.)
Cosmic Research, vol. 4, Sept.-Oct. 1966, p. 666-675. 10 refs.
Translation.

A67-31766
MAN AND DECOMPRESSION [L'HOMME ET LA DECOMPRESSION].
C. Nogues (Ministère des Armées, Service de Santé de l'Air, Paris, France) and L. Tabusse.
Revue Française d'Astronautique, June 1967, p. 17-21. In French.

Discussion of the behavior of the human organism under depressurization conditions. The endurance of the human organism is studied as a function of flight duration and altitude. A description of the experiments of von Beckh on chimpanzees subjected to an absolute-vacuum environment is given. The tolerance of the organism to altitude and anoxia and the physiopathological effects of atmospheric depression are discussed. M. F.

LC ENTRIES

A67-81250
CONSTANT VERSUS VARIED SERIAL ORDER IN PAIRED-ASSOCIATE LEARNING: THE EFFECT OF FORMAL INTRALIST SIMILARITY.
Eugene D. Rubin and Sam C. Brown (Kan. State U., Manhattan).
Journal of Experimental Psychology, vol. 73, Feb. 1967, p. 257–262. 15 refs.
Grants NIMH 5 T1 MH-8359-03 and NIMH MH-11179-01.

Facilitation of paired-associate (PA) learning by use of constant instead of varied order presentation of the pairs was found to vary significantly across four conditions of formal intralist similarity, representing all combinations of high and low stimulus (S) and of response (R) similarity. The largest facilitation occurred with high S similarity, the next largest with high R similarity. R similarity had an effect both under constant and varied conditions, S similarity only under the varied condition. All constant conditions, however, showed a reduction in errors for items in the beginning and end serial positions. Subsequent serial learning indicated significantly better performance on R terms when these appeared in the same as opposed to different positions in the PA list.

A67-81251
THE EFFECT OF EDUCATION ON THE DECLINE OF PSYCHOMETRIC TEST PERFORMANCE WITH AGE.
Samuel Granick and Alfred S. Friedman (Philadelphia Psychiat. Center, Pa.).
Journal of Gerontology, vol. 22, Apr. 1967, p. 191–195. 11 refs.
Grant NIMH MH 03674.

The hypothesis was proposed that, when the factor of the negative correlation of education with age in the adult population is controlled, much of the apparent decline in intellectual functioning associated with old age is reduced and, in some instances, eliminated. A battery of intellectual, perceptual, sensory, and psychomotor tests was administered to 77 subjects, mean age 59.61, S.D. 8.74. Correlations with age and with education were calculated for each of 33 representative test scores. Experimental control for the effect of education on the age correlations was achieved by partialing out the education factor from each of the correlations. The effect of this procedure was to reduce the number of significant negative correlations of test scores with age from 27 to 19 (30%). Generally, the scores which continued to show significant decline with age were measures of sensory efficiency, psychomotor speed, perceptual flexibility, and abstract thinking. All types of timed tests were consistently correlated negatively with age. No significant age-related decline was found in most of the untimed tests. Support of our hypothesis was thus obtained, which suggests that decline of functioning with age evidenced in this decline, is less extensive and slower in developing than is often reported. Our data, moreover, proved a basis for relative optimism regarding the basic ability of aged subjects to use acquired knowledge and to learn new ideas and skills.

A67-81252
THE EFFECT OF TEMPERATURE ON GLYCOLYSIS IN BRAIN AND SKELETAL MUSCLE FROM A HIBERNATOR AND A NON-HIBERNATOR.
Roy F. Burlington and Jacob E. Wiebers (Purdue U., Dept. of Biol. Sci., Lafayette, Ind.).
Physiological Zoology, vol. 40, Apr. 1967, p. 201–206. 15 refs.
Grant PHS IFI GM-13210-01A1.

The rate of glycolysis in brain and skeletal muscle from active of hibernating ground squirrels (*Citellus tridecemlineatus*) and albino rats was measured at 5°, 16°, 17°, and 38°C. The capacity for glycolysis was found to be significantly higher in brain tissue from the ground squirrel than from the rat at 27°, 16°, and 5°C. No consistent pattern of interspecific differences between their rates of glycolysis was noted in skeletal muscle, although muscle tissue from hibernating animals retained its capacity for glycolysis at higher temperatures (27°, 38°C.). Between 16° and 5°C., values for the Q_{10} temperature coefficient in cerebral tissue were substantially lower in the ground squirrel than in the rat. These differences were interpreted to be indicative of a cellular adaptation to cold in the hibernator. The data obtained from this study support the postulate that a high capacity for anaerobic glycolysis in the brain is related to the incrwased tolerance of the hibernator to hypothermia.

A67-81253
REACTIONS TO A DYADIC POWER STRUCTURE.
William P. Smith (Vanderbilt U., Nashville, Tenn.).
Psychonomic Science, vol. 7, Apr. 5, 1967, p. 373–374.
Grant NSF GS-201.

In a dyad where power and counterpower were determined by the value of each party's alternatives to the interaction, (a) subjects with a more valuable alternative liked their partner less and were more likely to choose the alternative than were those with a less valuable alternative; (b) subjects with little power both gave a higher estimate of their outcome from the interaction and tended to use their power more punitively than did those with much power.

A67-81254
EFFECT OF LOW BLOOD ALCOHOL LEVEL ON STEREOSCOPIC ACUITY AND FIXATION DISPARITY.
Eugene R. Wist (Franklin and Marshall Coll., Lancaster, Pa.), Francis W. Hughes, and Robert B. Forney (Ind. U., School of Med., Dept. of Pharmacol., Bloomington).
(Intern. Conf. on Alcohol and Traffic Safety, IVth, Bloomington, Ind., Dec. 6–10, 1965).
Perceptual and Motor Skills, vol. 24, Feb. 1967, p. 83–87. 7 refs.

The stereoscopic acuity and fixation disparity of nine subjects was measured before and after the consumption of one oz. of Scotch or bourbon whiskey per 150 lb. of body weight. It was found that, while stereoscopic acuity measures were unaffected by alcohol, fixation disparity increased significantly.

A67-81255
PERCEPTION BIBLIOGRAPHY: XXXIX. PSYCHOLOGICAL ABSTRACTS 1928, VOLUME 2.
C. H. Ammons and R. B. Ammons.
Perceptual and Motor Skills, vol. 24, Feb. 1967, p. 95–98. 107 refs.

One-hundred-seven items dealing with visual, tactile, and spatial perception and closely related topics are listed alphabetically.

A67-81256
MOTOR SKILLS BIBLIOGRAPHY: LVII. BALDWIN'S DICTIONARY THROUGH 1893.
C. H. Ammons and R. B. Ammons.
Perceptual and Motor Skills, vol. 24, Feb. 1967, p. 63–65. 89 refs.

Eighty-nine items concerning some aspect of motor skills are listed alphabetically. These aspects include psychomotor performance, body movement reaction time, and sensory perception.

A67-81257
KINDS OF EXPERIENCES IN THE PERCEPTION OF A CIRCLE.
Kristian Holt-Hansen (Copenhagen U., Psychol. Lab., Denmark).
Perceptual and Motor Skills, vol. 24, Feb. 1967, p. 3–32. 5 refs.

When the stimulus object is a circle subjects report many different kinds of experience apart from the perception of the circle. These include (among many others) radii, polygons, concentric circles, and small straight lines. Most of these experiences are characterized by rhythmic oscillations for which frequency measurements are given in c.p.s.

A67-81258
PERCEIVED SLANT AS A FUNCTION OF STIMULUS CONTOUR AND VERTICAL DIMENSION.
A. H. Smith (Defence Res. Med. Labs., Toronto, Canada).
Perceptual and Motor Skills, vol. 24, Feb. 1967, p. 167-173. 13 refs.

Twenty-four subjects judged the slants represented by nine trapezoids presented monocularly and binocularly, with fixed head under reduced viewing conditions. The trapezoids were the frontal-parallel plane projections of rectangles with the dimensions, 12 in. by 6 in., 10 in. by 5 in., and 8 in. by 4 in., each slanted 30°, 45° and 60°, but with their heights increased to 12 in., 10 in. and 8 in., respectively, and the other contour dimensions increased in proportion. All forms were displayed in the frontal-parallel plane only. The greatest variance in the slant judgments was associated with variation in contour. Decrease in stimulus height tended to be associated with increase in judged slant. Monocular and binocular judgments did not differ significantly. There were no significant interactions. The results were interpreted as supporting the contour perspective theory of monocular slant.

A67-81259
AUDITORY VIGILANCE AS AFFECTED BY SIGNAL RATE AND INTERSIGNAL INTERVAL VARIABILITY.
Richard L. Martz (U.S. Naval Submarine Med. Center, Groton, Conn.).
Perceptual and Motor Skills, vol. 24, Feb. 1967, p. 195-203. 16 refs.

Vigilance performances consisting of auditory threshold, latency of response, and false-positive response measures were obtained from 24 Navy and civilian subjects during the course of six daily 48-min. monitoring sessions in which subject pressed a microswitch to report single tones in signal trains of increasing intensity. Six signal rates from 2.5 to 120 signals/hr. and six intersignal intervals ranging up to 108 sec. around a signal rate of one/min. were found to have some differential effect on auditory threshold. An improvement of 3.25 db. in signal/noise detection occurred when signal rate was increased from 2.5 to 15/hr. Higher rates were not additionally effective. Below the rate of 15/hr., response latency increased regularly with the slower rates, although there was no further improvement with higher signal rates. Thus a rate of about one signal every four min. was the most efficient. Time-on-watch analysis revealed large individual differences. An analysis of false-positive responding indicated that false alarms were unrelated to signal rate, intersignal variability, or listening session.

A67-81260
MOTOR SKILLS BIBLIOGRAPHY: LVIII. PSYCHOLOGICAL INDEX NO. 1, 1894.
R. B. Ammons and C. H. Ammons.
Perceptual and Motor Skills, vol. 24, Feb. 1967, p. 277-278. 46 refs.

Forty-six items on various aspects of motor skills are listed alphabetically.

A67-81261
ELECTROPULSE RESPONSIVITY TO CHANGES IN SKIN MOISTURE.
R. L. Brown, R. A. Spern, and A. Solomon (George Washington U., Human Resources Res. Office, Washington, D. C.).
Perceptual and Motor Skills, vol. 24, Feb. 1967, p. 303-308. 10 refs. Army Dept. supported research.

Twelve subjects were exposed to electropulse stimulation under three moisture treatments: dry, water immersion, and a fluid approximation of sweat. Touch threshold data were obtained under these conditions during the first half of the experiment and electropulse recognition responses during the second half. A significant threshold rise occurred with increased amounts of moisture on the skin. Similarly, recognition accuracy decreased but remained within a 90 to 100% range. Human engineering implications pertinent to a tactual communication system were discussed.

A67-81262
VERTICALLY INDUCED AUTOKINESIS.
Leonard Brosgole and Robert M. Cristal (Naval Training Device Center, Port Washington, N. Y.).
Psychonomic Science, vol. 7, Apr. 5, 1967, p. 337-338.

The egocentric location of a fixated visual stimulus was shifted away from the apparent eye level position by means of induced motion. When the stimulus appeared to be in the periphery, the inducing frame was occluded resulting in autokinesis toward the phenomenal level of the eyes. This effect, termed induced autokinesis, was not obtained in certain predicted instances. It was concluded that apparent egocentric displacement is sufficient for initiating autokinesis.

A67-81263
THE EFFECTS OF AUDITORY STIMULATION ON PHOSPHENE SENSITIVITY.
Michael A. Follman and Frank J. Mandriota (N. Y. City U., City Coll., New York City).
Psychonomic Science, vol. 7, Apr. 5, 1967, p. 341-342. 6 refs. Grant NIMH 2 T 2 MH 07306-06.

Detection thresholds for phosphenes were measured in the presence and absence of moderate auditory stimulation. Thresholds were consistently lower in the presence of a 60 db., 3000 Hz. tone for all 19 subjects tested. Large variations in threshold levels were noted among the subjects.

A67-81264
THE EFFECT OF AUDITORY STIMULATION ON BLOOD PRESSURE CHANGES ASSOCIATED WITH PAIN.
Frank H. Farley (Wis. U., Madison).
Psychonomic Science, vol. 7, Apr. 5, 1967, p. 343-344. 7 refs.

The effects of auditory stimulation on systolic blood-pressure (SBP) increases elicited by the cold pressor procedure were studied in seven subjects, each subject acting on his own control. It was found that auditory stimulation significantly depressed SBP over a no-stimulation control condition.

A67-81265
SIGNAL DETECTION ANALYSIS OF RECALL PAIRED-ASSOCIATES LEARNING.
Milton D. Suboski (Queen's U., Kingston, Ontario, Canada).
Psychonomic Science, vol. 7, Apr. 5, 1967, p. 357 358. 6 refs. Soc. of the Sigma Xi and Queen's U. Arts Res. Comm. supported research.

Results replicating those of other authors on the use of confidence ratings in the RTT paradigm are presented. In addition, response operating characteristic (ROC) curve analyses show that subjects' ability to discriminate between correct and incorrect responses is a function of prior confidence and correctness.

A67-81266
A TEST OF THE CHRONIC-ACUTE HYPOTHESIS IN SEMANTIC GSR CONDITIONING.

Wolfgang G. Bringmann (Miss U., University).
Psychonomic Science, vol. 7, Apr. 5, 1967, p. 349–350. 12 refs.

Two alternative hypotheses (chronic vs. acute) about the nature of human anxiety, its relation to intensity of noxious stimulation; and its energizing effect in simple learning situations were examined. One group of subjects with high and one with low scores on a manifest anxiety scale (N = 38) were conditioned to give a galvanic skin response to the conditioning stimulus "light", with a 500 c.p.s. tone at 70 db. serving as non-noxious unconditioning stimulus (UCS). A tone of 500 c.p.s. at 90 db. served as noxious UCS for the other anxious and non-anxious groups (N = 37). A significant interaction between anxiety and UCS intensity obtained both for generalization and for extinction measures. The results support the acute hypothesis which states that high anxiety scores reflect an "acute" rather than a chronic state of anxiety.

A67-81267
INDIVIDUAL DIFFERENCES IN STORED DIGRAM FREQUENCIES AND THE IMMEDIATE SERIAL RECALL OF LETTER AND NUMBER STRINGS.
M. S. Mayzner and M. E. Tresselt (N.Y.U., New York City).
Psychonomic Science, vol. 7, Apr. 5, 1967, p. 359–360. 6 refs.
Contract Nonr 285(56).

This study examined the immediate serial recall of letter and number strings as a joint function of (a) the single-letter and sequential digram frequencies of the letter strings and (b) individual differences in the degree to which subjects already have in "store" information concerning the relative frequency of digrams as they occur in the language. The results clearly showed that high digram storage subjects show superior recall to low digram storage subjects for letter strings that vary both with respect to their single-letter frequencies and sequential digram frequencies, but that no differences in recall occur between the high and low digram storage subjects for the number strings.

A67-81268
METHOD OF STIMULUS PRESENTATION AND APPARENT BODY POSITION UNDER LATERAL BODY TILT.
M. Bauermeister, S. Wapner, and H. Werner (Clark U., Worcester, Mass.).
Perceptual and Motor Skills, vol. 24, Feb. 1967, p. 43–50. 6 refs.
Grant NIMH MH 00348.

Eighty subjects, 40 male and 40 female, indicated by means of a luminescent rod the location of their longitudinal body axis (apparent body position) under body tilt ranging from 90° left (counterclockwise), through upright, to 90° right (clockwise). The luminescent rod was presented by two psychophysical methods: (a) the method of limits and (b) the method of constant stimuli. Deviations of apparent from objective body position showed significant differences between the two methods. The results were interpreted in terms of an organismic theory of perception, utilizing the notion of a dynamic body schema as spatial reference system which was subject to modifications due to the method of stimulus presentation.

A67-81269
PROCEEDINGS OF THE SPACE BIOLOGY AND MEDICINE CONVENTION, NOV. 10–12, 1964 [MATERIALY KONFERENTSII PO KOSMICHESKOI BIOLOGII I MEDITSINE (10–12 NOIABRIA 1964 G)].
Edited by A. V. Lebedinskii, IU. G. Nefedov, and I. M. Zhazen. Moscow, Min. of Health, USSR, 1966, 150 p. Many refs. In Russian.

Seventeen papers presented at the conference are abstracted separately. The conference covered various aspects of aerospace medicine and biology such as life support systems for spacecraft, physiological effects on astronauts of the space environment, astronaut training and processing of biological data.

A67-81270
EFFECTS OF REINFORCEMENT INTERVALS IN PAIRED-ASSOCIATE LEARNING.
L. Keller, W. J. Thomson, J. R. Tweedy, and R. C. Atkinson (Stanford U., Calif.).
Journal of Experimental Psychology, vol. 73, Feb. 1967, p. 268–277. 16 refs.
NASA Grant NGR-05-020-036.

The length of the reinforcement interval (RI) in paired-associate learning was studied using a within-subject design to eliminate confounding of presentation rate with the time between successive presentations of the same item. Forty subjects were run for 15 trials on a 24-item list with RI of half, one, two, and four sec. Results indicated: (a) mean errors were a decreasing function of RI; (b) mean errors for items meeting a criterion were not related to RI; (c) precriterion mean latencies increased slightly for both correct and incorrect response, whereas post-criterion latencies decreased; and (d) the proportion of correct responses decreased as the number of intervening items increased, but the latency measure showed no effect. Several alternative models dealing with RI effects are proposed and evaluated against these data. None of the models proves entirely satisfactory.

A67-81271
EFFECT OF CIGARETTE SMOKING ON THE CRITICAL FLICKER FREQUENCY OF HEAVY AND LIGHT SMOKERS.
David H. Barlow and Daniel J. Baer (Boston Coll., Mass.).
Perceptual and Motor Skills, vol. 24, Feb. 1967, p. 151–155. 9 refs.

In order to evaluate the effects of smoking on critical flicker frequency (CFF), heavy and light smoker thresholds were determined five min. and one min. before, and then one, five, ten, and fifteen min. after ten inhalations of a cigarette. Although both groups of smokers showed a significant elevation in CFF immediately after smoking, the light smokers' CFF gradually returned to pre-smoking levels, while the heavy smokers' CFF fell below and then rose above the pre-smoking level.

A67-81272
PSYCHOLOGICAL PROBLEMS OF STATE OF ISOLATION DURING LONG SPACE MISSIONS [NEKOTORYE VOPROSY PSIKHOFIZIOLOGII IZOLIATSII PRIMENITEL'NO K DLITEL'NOMU KOSMICHESKOMU POLETU].
F. D. Gorbov and F. P. Kosmolinskii.
IN: MATERIALY KONFERENTSII PO KOSMICHESKOI BIOLOGII I MEDITSINE (10–12 NOIABRIA 1964 G.).
Moscow, Min. of Health, USSR, 1966, p. 120–125. In Russian.

During long space missions, particularly by one man, the effect of social isolation and deprivation of the stimuli of the normal environment may produce a state of boredom, which affects the degree of performance. Experiments with subjects isolated from the outside world showed a state of tension which can not be explained by the effect of fatigue. This tension produced also a disturbance of sleep characteristic of anxiety, which is different from the normal state of feeling of responsibility and expectation of possible accidents. It was established that training in the isolation chamber conditioned the subjects to such a state. Other measures, such as a contact of the astronaut with the other members of the flight command, and a regulation of activity and sleep markedly reduced such tension.

A67-81273
PERCEPTION BIBLIOGRAPHY: XL. PSYCHOLOGICAL ABSTRACTS, 1929, VOLUME 3, FIRST HALF.
R. B. Ammons and C. H. Ammons.
Perceptual and Motor Skills, vol. 24, Feb. 1967, p. 235–238. 90 refs.

An alphabetical listing is presented of 90 items dealing with olfactory, visual auditory, cutaneous, and spatial perception and closely related topics.

A67-81274
CERTAIN PHYSIOLOGICAL FACTORS TO BE CONSIDERED IN TRAINING ASTRONAUTS FOR LONG MISSIONS [NEKOTORYE FIZIOLOGICHESKIE POLOZHENIIA K RAZRABOTKE TEORETICHESKIKH I PRAKTICHESKIKH OSNOV TRENIROVKI KOSMONAVTA K DLITEL'NYM POLETAM].
I. M. Khazen.
IN: MATERIALY KONFERENTSII PO KOSMICHESKOI BIOLOGII I MEDITSINE (10-12 NOIABRIA 1964 G.).
Moscow, Min. of Health, USSR, 1966, p. 85-110. 102 refs. In Russian.

A series of experiments were conducted with the purpose of establishing a relationship between the various functional systems of the astronaut during the phase of adaptation to changes of external factors. Particular attention was paid to the responses of the neuro-secretory apparatus of the gastrointestinal tract which was taken as an indicator of the general response of the body. The production of serotonin with the gastric juice was found to be higher than normal during acceleration stress and hypoxia. This response could be responsible for motion sickness, particularly during coriolis stress, and can add to the effect on the vestibular apparatus. It was found that training of the subject led to adaptation and decreased the undesirable effect.

A67-81275
KEEPING TRACK OF SEQUENTIAL EVENTS: EFFECTS OF STIMULUS ON-TIME AND INTERSTIMULUS OFF-TIME.
Harvey A. Taub (Syracuse Veterans Admin. Hosp., Psychol. Serv., N. Y.), Richard A. Monty, and Kenneth R. Laughery (N. Y. State U., Buffalo).
Perceptual and Motor Skills, vol. 24, Feb. 1967, p. 159-166. 7 refs.

Subjects were required to keep track of the number of occurrences of each of four different letters (categories) presented sequentially as a function of the total number of letters presented (trial length), the rate of presentation, and the two components which, when combined, constitute the rate, namely, stimulus on-time and the interstimulus interval or off-time. In general, performance varied inversely with trial length and rate of presentation. Of greater importance, however, was the complex interaction between the rate of presentation and the components of that rate. At the fastest rate, performance was relatively invariant as a function of these components; at intermediate rates the shortest on-time led to the best performance, while at the slowest rate the shortest on-time led to the poorest performance. The observed results are explained primarily in terms of the time available for rehearsal.

A67-81276
UTILIZATION OF SPECIFIC CHARACTERISTICS OF ZEOLITES IN PHSYICAL-CHEMICAL PURIFICATION OF AIR IN CLOSED SYSTEMS [O VOZMOZHNOSTI ISPOL'ZOVANIIA POLIFUNKTSIAL'NYKH SVOISTV TSEOLITOV V SISTEME FIZIKO-KHIMICHESKOI REGENERATSII VOZDUKHA].
V. K. Cherkasov, G. S. Ushakova, L. I. Piguzova, A. V. Deviatko, V. I. Solov'ev, V. G. Mokhov, K. M. Portnova, R. V. D'iakonov, L. B. Patts, and R. A. Martynova.
IN: MATERIALY KONFERENTSII PO KOSMICHESKOI BIOLOGII I MEDITSINE (10-12 NOIABRIA 1964 G.).
Moscow, Min. of Health, USSR, 1966, p. 81-84. In Russian.

Recovery of oxygen from the atmospheric carbon dioxide in a closed ecological system may be accomplished by the use of zeolites, which can be specially processed. Two systems are described.

A67-81277
ON CATEGORICAL SCALES OF WEIGHT.
Yoshihisa Tanaka and Kazuo Nakatani (Tokyo U., Japan).
Perceptual and Motor Skills, vol. 24, Feb. 1967, p. 143-150. 5 refs. Min. of Educ. supported research.

The law of categorical judgment was applied to data on subjective weight in order to eliminate the possible biases. Conditions D, C, and a new approximation method were used. Stimuli were two series of plastic cylinders weighing 40 to 200 gm. The results indicate that linearity in the relationship between scale values R and stimulus values S increases as the number of assumptions decreases. When Scheffé's method is used, the relationship can be given by $R = 2.5\,S - 3.1$, which is similar to that obtained by the new method of the law of categorical judgment.

A67-81278
HIGH ALTITUDE ADAPTATION FOR INCREASING BODY TOLERANCE TO HYPOXIA AND OTHER FACTORS OF THE SPACE FLIGHT [AKKLIMATIZATSIIA V GORAKH KAK METOD POVYSHENIIA USTOICHIVOSTI ORGANIZMA K NEDOSTATKU KISLORODA I DRUGIM EKSTREMAL'NYM FAKTORAM KOSMICHESKOGO POLETA].
N. A. Agadzhanian, L. A. Briantseva, and G. A. Davydov.
IN: MATERIALY KONFERENTSIH PO KOSMICHESKOI BIOLOGII I MEDITSINE (10-12 NOIABRIA 1964 G.).
Moscow, Min. of Health, USSR, 1966, p. 70-80. 13 refs. In Russian.

Experiments in pressure chambers, simulating high altitudes, and experiences in mountain climbing showed the value of adaptation in humans to low pressure. Such training is valuable not only in acclimatization to rarefied atmosphere, but also to other factors with which astronauts may meet during space missions. Through training a man gets accustomed to the state of loneliness, monotonous conditions, sharp variations in temperature and humidity, all kinds of physical changes, and develops an ability to cooperate with other crew members. It will be advisable for future astronauts to spend 40-50 days prior to their space mission in the mountains at the altitude of 3,000-5,000 m.

A67-81279
EFFECT OF LIMITING OF MUSCULAR ACTIVITY ON HUMAN TOLERANCE TO PHYSICAL EXERCISE, ACCELERATION AND ORTHOSTATIC POSTURE [VLIIANIE ORGANICHENIIA MYSHECHNOI DEIATEL'NOSTI NA VYNOSLIVOST' CHELOVEKA K FIZICHESKOI NAGRUZKE, USKORENIIAM I ORTOSTATIKE].
L. I. Kakurin, R. M. Akhrem-Akhremovich, IU. V. Vaniushina, R. A. Vartbaronov, V. S. Georgievskii, B. S. Katkovskii, A. R. Kotovskaia, N. M. Mukharliamov, N. E. Panferova, IU. T. Pushkar', IU. A. Senkevich, S. F. Simpura, M. A. Cherepakhin, and P. G. Shamrov.
IN: MATERIALY KONFERENTSII PO KOSMICHESKOI BIOLOGII I MEDITSINE (10-12 NOIABRIA 1964 G.).
Moscow, Min. of Health, USSR, 1966, p. 111-119. 20 refs. In Russian.

During training of prospective astronauts for space flights of long duration, the effects of factors, such as low ambient pressure, hypoxia, acceleration, weightlessness and other factors are taken into consideration. However, the experiments on normal subjects immobilized by bed rest for a long period, given normal nutrition and all normal conditions of ambient air and sleep, disclosed the importance of prolonged hypokinesia on the function of the nervous system and its ability to coordinate activity of various body organs and systems. Particularly affected by the muscular inactivity is the blood circulatory system which carries a great burden under conditions of great stress, which is encountered during the extraterrestrial travel. Of great importance is the adjustment to normal terrestrial conditions and orthostatic posture upon sudden return of astronauts from space after being subjected for a long period of time to partial hypokinesia.

A67-81280
METHOD FOR STUDY OF THE FUNCTIONAL STATE OF DENERVATED HEART IN A DOG. PROBLEMS OF THE RELIABILITY OF HEART STUDIES [K METODIKE OTSENKI FUNKTSIONAL'NOGO SOSTOIANIIA DENERVIROVANNOGO SERDTSA SOBAKI (VOPROSY IZUCHENIIA NADEZHNOSTI SERDTSA)].
R. M. Baevskii, V. P. Demikhov, and N. M. Sharovskaia.
IN: MATERIALY KONFERENTSII PO KOSMICHESKOI BIOLOGII I MEDITSINE (10–12 NOIABRIA 1964 G.). Moscow, Min. of Health, USSR, 1966, p. 141–145. In Russian.

Development of bionics and the use of computers led to the reappraisal of the reliability of functions and performance of the mechanical systems. By analogy the reliability of biological systems in performing normal functions during a given time period must be determined. The discussion is based on an example of a living organism. A case is taken of a dog with an extra heart transplanted from another animal and attached to the experimental animal without the connection to the animal's nervous system, but performing only with the aid of secretory systems. The results indicated that the transplanted heart appeared to have a higher degree of reliability than the normal heart. These findings may suggest that the heart activity reliability may be achieved by a block of the cardiac enervation. This conclusion may be of great importance in application to space medicine. However, further studies are necessary to prove the validity of these findings.

A67-81281
EQUIPMENT NOTE: MEASURING FREQUENCY AND DURATION OF CONTROL MANIPULATION.
Roger Dooley.
Perceptual and Motor Skills, vol. 24, Feb. 1967, p. 217–218.

A method of collecting frequency-of-use and time-spent-operating data is described. The technique overcomes the difficulties of conventional methods by using touch controls which are sensitive to body capacitance.

A67-81282
EFFECTS OF SERIAL LEARNING ON RECOGNITION THRESHOLDS.
H. Keith Rodewald (Central Mich. U., Mount Pleasant).
Perceptual and Motor Skills, vol. 24, Feb. 1967, p. 119–124. 18 refs.

Different groups of subjects were given various amounts of practice on a serial list of nonsense syllables. The usual bow-shaped curve of correct anticipations as a function of serial position was obtained. The syllables were then exposed in a tachistoscope and their recognition thresholds were determined by the method of constant stimuli. Analysis of variance of the probabilities of correct recognition as a function of frequency, serial position, and stimulus duration indicated stimulus duration was the only significant determiner of the probabilities. The usual threshold-frequency relationship was not observed.

A67-81283
KEEPING IN STEP AWAY FROM IT ALL.
J. N. Mills (Manchester U., Physiol. Labs., Great Britain).
New Scientist, vol. 33, Feb. 9, 1967, p. 350–351.

Observations on cave dwellers spending long periods in isolation give much valuable information about man's biological clock. The indications are, however, that it is by no means a perfect time-keeper, requiring external stimuli to keep it adjusted. A large number of human circadian rhythms in body temperature, renal function, wakefulness, breathing, blood composition, and production of adrenal and other hormones has been shown to be independent of the grosser rhythmic fluctuations in habit and environment. Mathematical analysis of a sleep record shows that some process led to an increased probability of waking at regular intervals of 25 hr. rather than at any other moment.

A67-81284
DISTRACTOR AND PROBE TECHNIQUES IN SHORT-TERM MEMORY.
Bennet B. Murdock, Jr. (Toronto U., Canada).
Canadian Journal of Psychology, vol. 21, Feb. 1967, p. 25–35. 21 refs.
Grants NSF GB 4545 and NRC, Canada APA 146.

Two experiments were conducted to determine if, as commonly believed, there is a marked difference in short-term memory as a function of whether the retention interval is filled with unrelated non-learning materials (distractor technique) or with categorically related learning materials (probe technique). The first experiment was a replication of a previous trigram study, and inter-experiment comparisons suggested the same basic retention function for distractor and probe techniques. The second experiment attempted to show that both types of retention-interval activity had comparable effects in a probe type of paired-associate task. It was suggested that rate constants might differ but the function itself would not; and the amount of material to be remembered appears more critical than the type of interpolated activity.

A67-81285
KEEPING TRACK OF SEQUENTIAL EVENTS: IRRELEVANT INFORMATION AND PACED REHEARSAL.
Richard A. Monty, Robert Karsh, and Harvey A. Taub (Syracuse Veterans Admin. Hosp., Psychol. Serv., N.Y.).
Perceptual and Motor Skills, vol. 24, Feb. 1967, p. 99–103. 5 refs.

The effects of irrelevant information on subjects' ability to keep track of a changing situation mentally were examined. It appears that, when relevant stimuli are presented at an irregular rate of presentation, irrelevant stimuli interspersed with the relevant stimuli may enable subjects to pace rehearsal of the current state of the changing situation in a fashion that reduces the interference effects of the irregular rate of presentation.

A67-81286
CAUSES OF MOTION SICKNESS [K MEKHANIZMU SIMPTOMOKOMPLEKSA UKACHIVANIIA].
B. B. Bokhov.
IN: MATERIALY KONFERENTSII PO KOSMICHESKOI BIOLOGII I MEDITSINE (10–12 NOIABRIA 1964 G.). Moscow, Min. of Health, USSR, 1966, p. 146–147. 5 refs. In Russian.

The normal balance of an animal is determined by the pattern of summary stimuli of the semicircular canals and the auricular maculae during normal body positions. Unusual conditions such as coriolis stress, may create a new pattern which leads to a disturbance in the body responses. Training of an individual by subjecting him to the new conditions results in the adaptation and the dampening of the undesirable effect. Yet, new factors, such as anxiety and psychogenic fatigue, may reverse the state of adaptability to the abnormal body posture.

A67-81287
THE FACILITATION OF MEMORIZATION BY ALPHABETIC INSTRUCTIONS.

Marcia Earhard (Dalhousie U., Halifax, Canada).
Canadian Journal of Psychology, vol. 21, Feb. 1967, p. 15–24. 14 refs.
Grant NSF CB-810

It has been demonstrated that rate of memorization increases dramatically when subjects are instructed to remember the stimulus items in alphabetic order. This experiment investigated the factors responsible for the superior rate of memorization after alphabetic instructions. It was found that both (a) an invariant order for recall, and (b) the initial letter of each stimulus item were necessary conditions for the superior rate of alphabetic memorization to occur. The specific order of initial letters known as A, B, C, to Z was not required, and the initial letters of the stimulus items proved to be quite powerful cues for retrieval even under conditions where the order of cues changed systematically each trial.

A67-81288
TRANSFER OF ADAPTATION AS A FUNCTION OF INTERPOLATED OPTICAL TILT TO THE IPSILATERAL AND CONTRALATERAL EYE.
Sheldon M. Ebenholtz (Conn. Coll., New London).
Journal of Experimental Psychology, vol. 73, Feb. 1967, p. 263–267. 6 refs.
Grant NIMH MH-08706.

Six groups of eight subjects each were exposed to a 10° rotation of the optic array for the first of two and one-half-hr. intervals. During the second half hr. two positive transfer (P) groups received the same stimulation as in the first session and two negative transfer (N) groups were exposed to a 10° tilt in the opposite direction. In each case one group exposed the ipsilateral (I) and the other the contralateral (C) eye relative to the eye exposed initially. The remaining control groups (viz., CC and CI) wore blindfolds. Both control groups showed a significant drop in adaptation after the second interval; PC and PI showed no change and NI and NC produced the largest shifts. These results were shown to be fully consistent with the assumption that adaptation is a linear function of the angular difference between successively exposed optical tilts. Additional implications of this proposition were discussed.

A67-81289
INTERACTION BETWEEN A VISUALLY PERCEIVED SIMPLE FIGURE AND AN APPROPRIATE VERBAL LABEL IN RECALL.
Ronald L. Cohen (Uppsala U., Psychol. Lab., Sweden).
Perceptual and Motor Skills, vol. 24, Feb. 1967, p. 287–292.
Swed. Council for Social Sci. Res. supported research.

Using a circle with a 90° gap as stimulus figure and the verbal labels a clock set at five min. to seven and a clock set at ten min. to eight, several experimental conditions were run to test the interaction between the figure and the label in recall, after the stimulus had been labelled just prior to its presentation. From the obtained results the conclusion was drawn that the main interaction occurs during the recall phase, there existing two separate memory traces, a visual and a verbal, up to the time of recall.

A67-81290
RESPONSE OF THE HUMAN BODY TO VARIOUS FACTORS CHARACTERISTIC OF THE ENVIRONMENT OF SPACECRAFTS [OBSHCHIE ZAKONOMERNOSTI REAKTSII ORGANIZMA CHELOVEKA NA KOMPLEKSNOE VOZDEISTVIE FAKTOROV SREDY, KHARAKTERNOI DLIA KOSMICHESKIKH LETATEL'NYKH APPARATOV].
A. V. Lebedinskii, S. V. Levinskii, and IU. G. Nefedov.
IN: MATERIALY KONFERENTSII PO KOSMICHESKOI BIOLOGII I MEDITSINE (10–12 NOIABRIA 1964 G.).
Moscow, Min. of Health, USSR, 1966, p. 3–10. In Russian.

Experiments of man's behavior in a simulated spacecraft environment showed large changes in all phases of physiological functions brought about by such factors as limited space, accumulation of carbon oxides, variations of ambient temperature, microorganic contamination by human shedding and disturbance of sleep. Brief periods of acceleration stress and the repeated state of weightlessness produced conditions to which the human organism must be adapted. Long range experiments showed that man can become adjusted to new environmental condition; however, sudden return to the normal terrestrial environment could produce a severe physiological shock.

A67-81291
BASIC PRINCIPLES OF CLOSED ECOLOGICAL SYSTEMS [OSNOVNYE PRINTSIPY POSTROENIIA SISTEM KRUGOVOROTA VESHCHESTV].
IN: MATERIALY KONFERENTSII PO KOSMICHESKOI BIOLOGII I MEDITSINE (10–12 NOIABRIA 1964 G.).
Moscow, Min. of Health, USSR, 1966, p. 11–17. In Russian.

Terrestrial environment does not have any strictly closed ecological systems. The turnover of organic and inorganic components of the biosphere usually embraces many biocenoses. Space missions, however, require selfsufficient and small biological cycles. The most important cycle in spaceflight is the recovery of water, various systems are discussed. Cycling with microorganisms of organic substances necessary for production of energy, and for reconstruction of body tissue is reviewed. These compounds of proteins, lipids and carbohydrates must be reconverted from the human waste products for human consumption. This process is possible through the use of various autotrophs and heterotrophs. The important factor in the construction of such systems aboard spacecraft is the greatest yield with minimum expenditure of energy.

A67-81292
METHODS OF DECREASING BACTERIAL CONTAMINATION OF ENVIRONMENT DURING LONG SPACE MISSIONS [NEKOTORYE PUTI SNIZHENIIA MIKROBNOI OBSEMENENNOSTI V DLITEL'NOM KOSMICHESKOM POLETE].
V. V. Borshchenko, M. I. Kazar', F. K. Savinich, and G. V. Shcheglova.
IN: MATERIALY KONFERENTSII PO KOSMICHESKOI BIOLOGII I MEDITSINE (10–12 NOIABRIA 1964 G.).
Moscow, Min. of Health, USSR, 1966, p. 29–34. 17 refs. In Russian.

In order to decrease bacterial shedding from humans into cabin air, or prevent general contamination of area visited by man, or by instrument landings, some bacteriostatic and bacteriocidal measures are necessary. Experiments conducted for four months on subjects in the chambers simulating the outerspace conditions, showed that humans showed a depression of bacterial tolerance. In many cases the subject's skin contained more bacteria than normal skin. It was difficult to find definite methods for prevention of bacterial shedding except for a simple treatment of cloth, used for spacesuits, with some bacteriocidal materials. Saturation of cloth with 10% solution of orthooxidiphenyl or 5% copper sulphate was tried. Unfortunately, washing removed the antiseptics. Longer adherence of these substances was noted on synthetic fabrics. These chemicals did not affect the natural bacteriocidal property of normal skin, and produced no skin irritation.

A67-81293
MEANS AND METHODS OF THE UTILIZATION OF BODY WASTE PRODUCTS IN THE SPACECRAFT CABINS [PUTI I METODY UTILIZATSII PRODUKTOV ZHIZNEDEIATEL' NOSTI V KABINAKH KOSMICHESKIKH KORABLEI].
S. V. Chizhov.
IN: MATERIALLY KONFERENTSII PO KOSMICHESKOI BIOLOGII I MEDITSINE (10–12 NOIABRIA 1964 G.).
Moscow, Min. of Health, USSR, 1966, p. 18–22. In Russian.

Recovery of useful compounds from human waste products during space mission with coordinated systems are discussed. Recovery of water can be done by lyophilization, catalytic oxidation, and vacuum distillation. Final purification of water is accomplished by use of the ion-exchange resins and activated charcoal. Recovery of water from atmospheric condensation will require more refined methods which are still in the experimental stage. An important procedure of waste recovery consists of two stages: (1) conversion of organic compounds into carbon dioxide, water, and minerals; and (2) biological build-up of organic compounds utilizable by the human. Preliminary treatment of waste products can be by use of chemicals, use of aerobic microorganisms, catalytic oxidation and burning and oxidation in solutions by high temperature. Ionizing radiation, ultraviolet light, ultrasound and certain gases also can be used. Certain parts of the waste materials, however, must be burned, such as cellulose, nails and hair. During all this activity some volatile matter and gases may be formed which may be toxic to man, and must be eliminated.

A67-81294
UTILIZATION OF DEHYDRATED FOODS BY ASTRONAUTS [O VOZMOZHNOSTI ISPOL'ZOVANIIA OBEZVOZHENNYKH PRODUKTOV V PITANII KOSMONAVTOV].
V. P. Bychkov, N. N. Boiko, A. G. Kasatkina, IU. I. Kondrat'ev and A. S. Ushakov.
IN: MATERIALY KONFERENTSII PO KOSMICHESKOI BIOLOGII I MEDITSINE (10–12 NOIABRIA 1964 G.).
Moscow, Min. of Health, USSR, 1966, p. 23–28. In Russian.

Several young male subjects were kept on a diet which can be used during space missions. The food items consisted of three types: (1) Lyophilized; (2) dehydrated by heat, and (3) normal food. The lyophilized diet consisted of beef and pork sausages, ground meat, canadian bacon and beef broth. The dry-heat processed food contained milk products, such as cottage cheese, and milk and cream in various combinations, nuts, coffee and chocolate. The third group consisted of common cookies, hardtack, candies, prunes and nuts. All these foods were consumed in the dry state with tea, coffee and broth. The daily caloric intake was 2,117–2,770 cal. The diet was used for a period of 22 days. Urine volume was registered, and water recovered and reused. There were slight variations in body weight and in the biochemical findings, which indicated that such foods could be used during space missions lasting about a month.

A67-81295
AGE DIFFERENCES IN CHOICE REACTION TIMES TO VERBAL STIMULI.
K. F. Riegel and J. E. Birren (Natl. Inst. of Mental Health, Sect. on Aging, Bethesda, Md.).
Gerontologia, vol. 13, no. 1, 1967, p. 1–13. 14 refs.
Grant NICHHD PO1 HD 1368-01.

Choice reaction times to ten light stimuli were measured for 30 young and 23 old subjects. The correct response buttons that would turn off particular lights were indicated by verbal cues. Lights and buttons were either marked by first and second syllables that form two-syllable adjectives, verbs, concrete or abstract nouns, or by word-pairs that represent whole-part, coordinate, or superordinate relationships. Differences between age groups, between first and second trials and between tasks were highly significant as well as several interaction terms. Old subjects were always slower than the young except for the first trial on the concrete nouns. During the second trials young subjects improved their performance relatively more than old subjects. For a more detailed analysis, the reaction times were correlated with various factors representing the experimental or the psychological conditions of the tasks. The latter, and in particular, control measures of verbal associations were found to be the best predictors of reaction times in complex cognitive tasks. Factors in the experimental arrangements were better predictors in the simple tasks of syllable or word matching. Differences in long term verbal habits seem to explain age differences in the various reaction tasks.

A67-81296
DELAYED SENSORY FEEDBACK IN VISUAL AND AUDITORY TRACKING.
Michael J. Wargo (Tufts U., Medford, Mass.).
Perceptual and Motor Skills, vol. 24, Feb. 1967, p. 55–62. 7 refs.
Link Found. supported research.

Visual compensatory, visual pursuit, auditory compensatory, and auditory pursuit tracking of 20 male college students was observed under the conditions of .000-, .210-, .420-, and .840-sec. transmission type control delay. Tracking efficiency decreased as transmission delays increased; visual tracking was consistently superior to auditory tracking, although the relative degradation across delays was greater for visual than for auditory tracking; and little if any adaptation to the delays was apparent. These results point out the essentially similar effects of delayed sensory feedback on equivalent motion patterns when guided by different feedback modalities.

A67-81297
SPACE RACE AFTER APOLLO 204.
Kenneth W. Gatland (Brit. Interplanet. Soc., London, Great Britain).
New Scientist, vol. 33, Feb. 9, 1967, p. 324–325.

The Apollo 204 disaster may have had a great effect on the U.S. space-race because of the time involved in redesign and development. The greatest problem faced as a result of the tragedy centers around the requirements for the spacecraft atmosphere. American spacecraft have used 100% O_2 at low pressure in order to achieve structural lightness while Russian spacecraft atmospheres have contained nitrogen or helium as diluents at full pressure. The American Biosatellite has been provided with a full-pressure oxygen–nitrogen atmosphere. Russia, too, has problems and has not come to the final stage of planning for landing a man on the moon. Politically, however, the Russians have an advantage since they have set no target date as has the United States.

A67-81298
PEMOLINE AND MAGNESIUM HYDROXIDE VERSUS PEMOLINE: ENHANCEMENT OF LEARNING AND MEMORY OF A CONDITIONED AVOIDANCE RESPONSE IN RATS.
N. Plotnikoff and P. Meekma, Jr. (Abbott Labs., Pharmacol. Dept., Chicago, Ill.).
Journal of Pharmaceutical Sciences, vol. 56, Feb. 1967, p. 290–291. 10 refs.

Pemoline and magnesium hydroxide was found to be several times more potent that pemoline alone in enhancing the acquisition and retention of a conditioned avoidance response in rats.

A67-81299
REPRODUCTION OF TIME INTERVALS AFTER SHORT PERIODS OF DELAY.
Peter du Preez (Cape Town, U., Rondebosch, South Africa).
Journal of General Psychology, vol. 76, Jan. 1967, p. 59–71. 23 refs.

Attempts have been made previously to understand estimation of time in terms of fading trace theories. There were, however, several problems connected with those previous experiments and many questions which remained unanswered. In the present experiment, reproductions of time intervals ranging from 1 to 16 sec. at various intervals of delay, ranging from zero to 60 sec. were required. The method consisted of timed arm movements. It is known that spatial metaphors are common in our reference to time, and it is known that the judgment of time is dependent on the distance covered when young children are used as subjects. It appears, therefore, that subjects are able to use the distance of their movement to stabilize their reproduction of the time interval. A continuous signal was used in the present experiment. The results do not support fading trace theories of time judgment. Nor is there evidence that excitation-inhibition or satiation effects occur. It appears that the nature of the stimulus, which will determine whether encoding is possible or not, is important.

A67-81300
EXPONENTIAL DECAY AND INDEPENDENCE FROM IRRELEVANT ASSOCIATIONS IN SHORT-TERM RECOGNITION MEMORY FOR SERIAL ORDER.
Wayne A. Wickelgren (Mass. Inst. of Technol., Cambridge).
Journal of Experimental Psychology, vol. 73, Feb. 1967, p. 165–171. 6 refs.
NASA Grant NsG 496 and Grant NIMH MH 08890-02.

A test of association between two adjacent items in a digit series was provided by giving subject a test pair of items and having him decide whether the response member of the pair followed the stimulus member in the preceding digit series. Probabilities of correct and incorrect recognition from various conditions were used to estimate the strength of the associations in short-term memory using the operating characteristic of signal-detection theory. A mathematical model for serial-order recognition memory was proposed which assumed that the strength of interitem associations decays exponentially and that subject's response in a recognition test depends on the strength of the test association in relation to a criterion, not upon the strength of that association relative to the strength of other associations to the same test stimulus.

A67-81301
AUDITORY AND CUTANEOUS APPARENT SUCCESSIVENESS.
George A. Gescheider (Hamilton Coll., Clinton, N.Y.).
Journal of Experimental Psychology, vol. 73, Feb. 1967, p. 179–186. 12 refs.
Grant NIMH MH 11096-01.

Cross-modality matching of temporal intervals revealed that pairs of auditory stimuli separated by less than 30 msec. were perceived as more successive than pairs of stimuli separated by more than 30 msec. were perceived as equally successive. In the fractionation of temporal intervals (half-as-successive and twice-as-successive judgments) the relationship between apparent auditory successiveness and the duration of the temporal interval between stimuli was found to be a power function with an exponent of .97 for intervals of 2–368 msec. The cutaneous scale of apparent successiveness derived from cross-modality matching data and the auditory scale was in close agreement with the cutaneous scale constructed directly by the fractionation method. For temporal intervals between stimuli less than 30 msec. the cutaneous scale was not a power function until a correction was made for the relatively high cutaneous temporal resolution threshold.

A67-81302
CATEGORIZATION TIME WITH CATEGORIES DEFINED BY DISJUNCTIONS AND CONJUNCTIONS OF STIMULUS ATTRIBUTES.
Raymond S. Nickerson (Decision Sci. Lab., L. G. Hanscom Field, Bedford, Mass.).
Journal of Experimental Psychology, vol. 73, Feb. 1967, p. 211–219. 13 refs.

Subjects were asked to decide as quickly as possible whether stimuli belonged to categories defined in terms of conjunctions or inclusive disjunctions of readily discriminated attributes, and to register their decisions by pressing one of two response keys. The independent variables of interest were the number of attributes which were relevant to a category criterion (r), and the number of attributes with respect to which a stimulus satisfied (s), or failed to satisfy (f), a criterion. It was found (a) that with disjunctive criteria positive RT varied directly with r and inversely with s, (b) that the latter effect persisted after considerable practice, (c) that with conjunctive criteria negative response time (RT) varied inversely with f, (d) that this effect also persisted with practice, (e) that negative instances of disjunctive categories and positive instances of conjunctive categories produced shorter RT than would have been expected from an extrapolation of the results with positive and negative instances of disjunctive and conjunctive categories, respectively, and (f) that with both disjunctive and conjunctive criteria error rates were highest under those conditions in which RT was longest. Implications of the results for the question of sequential vs. parallel information processing modes were considered.

A67-81303
SECONDARY TASK INTERFERENCE IN THE PERFORMANCE OF TRACKING TASKS.
Don Trumbo, Merrill Noble, and Jay Swink (Kan. State U., Manhattan).
Journal of Experimental Psychology, vol. 73, Feb. 1967, p. 232–240. 10 refs.
NASA Grant NsG 606 and Grant AF-AFOSR 526-64.

The effects of secondary verbal tasks on tracking performance were examined. In the first experiment, redundancy was varied in both primary and secondary tasks, with the latter introduced at a retention session. The secondary task resulted in marked interference, independent of either primary or secondary task redundancy, primarily in the timing aspect of tracking. In the second experiment, stimulus and response components of the secondary task were presented separately. The response component produced as much interference as the cognitively more difficult secondary task. The third experiment showed that secondary task effects occur independent of a retention interval.

A67-81304
THREE-STIMULUS TWO-CHOICE AUDITORY DISCRIMINATION LEARNING WITH BLANK TRIALS.
John W. Moore and Joseph Halpern (Mass. U., Amherst).
Journal of Experimental Psychology, vol. 73, Feb. 1967, p. 241–246. 7 refs.
Grant NIH-MH-10794.

Three tonal discriminative stimuli were presented equally often in a probability-learning task consisting of a total of 360 trials. Two tones, S_1 (720 c.p.s.) and S_2 (800 c.p.s.), were consistently associated with E_1 and E_2 event lights, respectively. A third tone (S_3), located at one of five positions on the frequency dimension such that $S_1 \leq S_3 \leq S_2$, was paired with E_1 and E_2 on a 50:50 basis for half the

subjects, but was never reinforced (E_0) for the other half. Marginal and sequential statistics from this 5×2 factorial design with 12 subjects per cell were related to current interpretations of the role of blank trials in choice behavior.

A67-81305
ION CONTENT OF AIR IN THE AIR-TIGHT CABINS, AND ITS EFFECT ON THE HUMAN BODY [AEROIONNYI SOSTAV VOZDUKHA GERMETICHESKIKH KAMER I EGO VLIIANIE NA ORGANIZM CHELOVEKA].
IU. G. Nefedov, B. V. Anisimov, A. A. Veselova, S. N. Zaloguyev, V. V. Zhuravlev, L. R. Iseev, N. N. Komarov, A. N. Kartsev, G. T. Ivanenko, and S. V. Levinskii.
IN: MATERIALY KONFERENTSII PO KOSMICHESKOI BIOLOGII I MEDITSINE (10-12 NOIABRIA 1964 G.).
Moscow, Min. of Health, USSR, 1966, p. 35-51. 11 refs. In Russian.

Results of studies of the effect of ionized air in the closed cabins on human physiology disclosed a slight, although not always well defined, change from normal. Negative ions, together with an increase of excitation, caused an increase in muscular capacity, pulmonary ventilation, and the gas exchange level in a subject engaged in physical exercise. Under various conditions positive or negative ions produced an increase or a depression of various physiological functions, and the biochemical state. Thus, concentration of proteins, glucose, bile salts, and lactic acid fluctuated with the change of the ion charge. A general conclusion can be reached that a continuous confinement in an air tight cabin where the inside air can become ionized may lead to a pronounced disturbance in human body functions.

A67-81306
DEHYDRATION OF AIR IN THE LIFE-SUPPORT SYSTEMS OF THE AIR-TIGHT CABINS [OSUSHKA VOZDUKHA V SISTEMAKH ZHIZNEOBESPECHENIIA GERMETICHESKIKH KABIN].
N. P. Perfil'ev, V. M. Men'shova, and V. K. Golov.
IN: MATERIALY KONFERENTSII PO KOSMICHESKOI BIOLOGII I MEDITSINE (10-12 NOIABRIA 1964 G.).
Moscow, Min. of Health, USSR, 1966, p. 52-55. In Russian.

In the air-tight cabins the excess of moisture in the atmosphere must be condensed and removed, or absorbed on such compounds as activated charcoal, often impregnated with lithicum or calcium chlorides. A new method for moisture removal from air, based on the use of a diffusion membrane is described.

A67-81307
BASIC PRINCIPLES OF MAINTAINING ATMOSPHERIC COMPOSITION IN CABINS OF SPACECRAFT [OSNOVNYE PRINTSIPY FORMIROVANIIA ATMOSFERY KABIN KOSMICHESKIKH KORABLEI].
A. G. Kuznetsov.
IN: MATERIALY KONFERENTSII PO KOSMICHESKOI BIOLOGII I MEDITSINE (10-12 NOIABRIA 1964 G.).
Moscow, Min. of Health, USSR, 1966, p. 58-69. 8 refs. In Russian.

Composition and pressure of the atmosphere in a spacecraft cabin should be maintained as close to the terrestrial normal as possible in order to prevent serious shifts in the physiology and biochemistry of the human. Pressure below 190 mm. Hg may lead to oxygen deficiency, while pressure close to terrestrial norms may prevent serious injuries in cases of accidents. Pure oxygen atmosphere is more economical to maintain than nitrogen or helium mixtures, but pure oxygen may have injurious effect on the pulmonary tissues as well as being less safe. Substitution of nitrogen, as a dilutant, by helium shows advantages and disadvantages. Some of the disadvantages are: (1) faster rate of diffusion which may lead to formation of air embolism; and (2) greater thermal conductivity, which may lead to greater fluctuation of body temperature, either in overheating or in overcooling.

A67-81308
CRITERION METHOD FOR PROCESSING DATA IN BIOLOGY AND MEDICINE [KRITERIAL'NYI METOD ISSLEDOVANII V BIOLOGII I MEDITSINE].
IU. N. Sushkov.
IN: MATERIALY KONFERENTSII PO KOSMICHESKOI BIOLOGII I MEDITSINE (10-12 NOIABRIA 1964 G.).
Moscow, Min. of Health, USSR, 1966, p. 126-140. In Russian.

A "criterion method" is under consideration which can be used for processing biomedical data. It is different from the usual statistical treatment. By combination of constants and variables a mathematical expression can be formulated, which will have a constant value for a group of similar subjects. The accuracy of mathematical analysis depends on the number of variables. The greater the number, the greater the accuracy. This premise makes necessary the use of a computer. Whereas, the statistical method requires a change of only one variable, the "criterion" method, on the contrary, depends on the change of all variables. This assumed position allows a faster analysis by reduction of the number of experiments. Individual characteristics of the subjects and accidental factors lead to the displacement oa points on the curve of the statistical analysis. To avoid this, the new method uses a preliminary simple linear relationship. The theory of analysis is described.

A67-81309
AMBIENT TEMPERATURE AND TIME ESTIMATION.
John M. Lockhart (U.S. Army Natick Labs., Pioneering Res. Div., Natick, Mass.).
Journal of Experimental Psychology, vol. 73, Feb. 1967, p.286-291. 15refs.

United States Army volunteer test subjects made time estimations of three classes of standard intervals-small, M=8.19 sec.; medium, M=23.75 sec.; large, M=44.03 sec.-according to one of two methods, Production (P) or Verbal Estimation (VE), under three ambient temperature conditions, 40° F., 80° F., and 110° F. with 50% relative humidity. For all interval classes, time estimates by the P method were significantly smaller under the 40° F. and 110° F. conditions than those under the 80° F. condition. For medium intervals with the VE method, the mean time estimate at 40° F. was significantly larger than that at 80° F. It was concluded that, relative to the control condition, the internal clock ran fast under extreme temperature conditions. The results were discussed in relation to a model of the internal clock.

A67-81310
INTERACTION OF SIMULTANEOUS AND SUCCESSIVE STIMULUS GROUPINGS IN DETERMINING APPARENT WEIGHT.
Dorothy Dinnerstein, Isa Gerstein, and George Michel (Rutgers U., Inst. for Cognitive Studies, Newark, N. J.).
Journal of Experimental Psychology, vol. 73, Feb. 1967, p.298-302.
Rutgers Res. Council supported research.

In a recent study, which confirmed with a constant stimuli procedure that apparent weight is contextually determined, standard and variable (s and v) weights were lifted successively in subject's right hand, each accompanied by a different non-judged context weight (cw) in the left. Here, to examine the relation between simultaneous (intermanual) and temporally

extended (intramanual) context influences, that procedure is replicated with time and space reversed: s and v are lifted simultaneously in both hands, each preceded by a different cw. As in the previous study, results show a consistent effect of the cw's on the apparent heavinesses of the judged weights, as reflected in the frequency with which each v is judged lighter vs. heavier than s. The effect, however, is markedly larger in the present than in the previous study. This finding, like earlier findings on visual shape, supports the view that context effects reflect the relative strengths of competing stimulus item subgroupings.

A67-81311
PSYCHOLOGICAL REFRACTORY PHASE AND THE FUNCTIONAL SIGNIFICANCE OF SIGNALS.
Raymond S. Nickerson (Decision Sci. Lab., L. G. Hanscom Field, Bedford, Mass.).
(Am. Psychol. Assn., Conv., Los Angeles, 1964).
Journal of Experimental Psychology, vol. 73, Feb. 1967, p. 303–312. 21 refs.

Six experiments were conducted to investigate the effects of the functional, or informational, significance of signals on the "psychological refractory phase." In brief, it was found that the response to the second of two successive, but variably spaced, signals was delayed when the interval between signals was sufficiently brief, whether or not an overt motor response had to be made to the first signal, and whether or not the first signal carried information which was critical to the performance of the task. The magnitude of the delays obtained depended both on the functional significance of the signals and on the motor requirements of the task. The implications of these and ancillary findings for "single channel" and "expectancy" theories of psychological refractory phase were discussed.

A67-81312
SPEEDED ADDITION AND SLEEP LOSS.
Harold L. Williams (Okla. U., School of Med., Norman) and Ardie Lubin (U. S. Navy Neuropsychiat. Res. Unit., San Diego, Calif.).
Journal of Experimental Psychology, vol. 73, Feb. 1967, p. 313–317. 16 refs

The effect of two nights of acute sleep deprivation on E-paced addition tests was to impair speed but not accuracy. Impairment was, roughly speaking, a multiplicative function of speed load (time per addition) and amount of sleep loss. If sufficient time per addition was allowed, there was no impairment up to two nights of sleep deprivation. The most sensitive of several E-paced tasks was one in which input and output requirements were held constant while the number of adding operations was increased. This finding implies that cognitive speed is especially vulnerable to drowsy states.

A67-81313
SELECTION OF SPACE-CABIN ATMOSPHERES.
Emanuel M. Roth (Lovelace Found. for Med. Educ. and Res., Dept. of Aerospace Med. and Bioastronautics, Albuquerque, N. Mex.).
Space Science Reviews, vol. 6, Feb. 1967, p. 452–492. Many refs.
NASA Contract NASr-115.

Selection of space cabin atmospheres has become a major question in the planning of manned space programs. The most significant factors in this man-machine interaction which define the selection process were presented. Included were: (1) total pressure; (2) partial pressure of O_2; (3) fire and blast hazard; (4) diluent inert gas factors; (5) humidity and temperature control; (6) CO_2 control; (7) toxic contaminants; (8) dusts, aerosols and ions; (9) circulation of atmosphere; and (10) minimization of weight, power, complexity and cost. Both engineering and physiologic problems must be considered for space cabin selection. The selection of an inert diluent is an especially complex problem both physiologically and from the viewpoint of engineering. The economic factors in choice of atmosphere are development time maintainance, convertibility, crew acceptance and cost. One atmosphere cannot be selected as ideal for all missions. The physiologic as well as the engineering and operational requirements for each space mission must be considered in selection of the ideal atmosphere.

A67-81314
UPTAKE AND RELEASE OF FREE ACIDS AND OTHER METABOLITES IN THE LEGS OF EXERCISING MEN.
Richard J. Havel, Bengt Pernow, and Norman L. Jones (Calif., U., San Francisco Med. Center, Dept. of Med. and Cardiovascular Res. Inst.).
Journal of Applied Physiology, vol. 23, Jul. 1967, p. 90–96. 19 refs.
Grant PHS HE-06285.

The contribution of metabolites in blood plasma to oxidative metabolism in leg tissues during exercise on a bicycle ergometer was estimated from analyses of arterial and femoral venous blood in subjects receiving a constant intravenous infusion of palmitate-l-^{14}C. Extraction fraction of free fatty acids (FFA) in leg tissues was lower during exercise than at rest, but influx of FFA into the legs was greater. During exercise, output of ^{14}C in blood CO_2 approximately equaled input from plasma FFA within one hr. Plasma FFA supplied approximately half and plasma triglyceride fatty acids less than 10% of the fatty acids burned in the leg during exercise, estimated from gas exchanges. Released of glycerol was insignificant. Uptake of glucose-carbon from the blood averaged 16% of CO_2 output and an amount of lactate equivalent to one-third of glucose-carbon was released from the legs. It is suggested that about half of the fatty acids and more than half of the glucose oxidized in the leg were derived from local stores of lipid and carbohydrate.

A67-81315
PHYSIOLOGIC AND ENVIRONMENTAL MONITORING OF MANNED SPACE FLIGHTS.
Thomas O. Nevison, Jr. (Lovelace Found. for Med. Educ. and Res., Dept. of Biol. Instr., Albuquerque, N. Mex.).
(Am. Soc. of Plastic and Reconstructive Surgeons, Meeting, Las Vegas, Oct. 1966).
Plastic and Reconstructive Surgery, vol. 39, Mar. 1967, p. 301–306. 20 refs.

Physiologic and environmental monitoring of manned spaced flights is important for flight safety and for the collection of information on the effects of space flight on man. The parameters that have been measured in both U.S. and Soviet space flights were listed. At least one electrocardiogram lead and at least one measure of respiration have been monitored on all manned flights of both countries. Other important parameters are blood pressure, body temperature, measurements of the motion or vibrations of the chest wall associated with cardiac contraction, electroencephalograms, electro-oculograms, and cabin atmosphere information. There have been no great advances in techniques used to monitor the physiologic parameters of astronauts on their environments. There have been improvements, however, in the reliability of many medical instruments and miniaturization of equipment used for monitoring. The problem of monitoring

very long space flights may promote improvements in the collection and examination of physiologic data. The advances arising from the space program will probably have a significant impact on the everyday practice of medicine.

A67-81316
PULSUS PARADOXUS. EFFECT OF GRAVITY AND ACCELERATION IN ITS PRODUCTION.
Charles W. Urschel (Aerospace Med. Div., Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).
American Journal of Cardiology, vol. 19, Mar. 1967, p. 360–364. 16 refs.

The appearance of pulsus paradoxus of significant degree was noted during 60° head-up tilt and during rotation of the seated subject in the vertical axis. Common to both studies were decreases in venous return and cardiac output. Analysis of the temporal relations between inspiration and the decline in arterial pressure negates any constant direct influence of inspiration on left ventricular pressure. The relation is in fact rate-dependent; at slow respiratory rates the effect of inspiration is to enhance systemic pressure, and at higher rates inspiration appears deleterious only because of phase lag. In the two stresses studied, pulsus paradoxus seemed predominantly due to phasic right ventircular output delayed in appearance by resistive and capacitative impedance of the lung.

A67-81317
SWEAT SODIUM EXCRETION IN NORMAL WOMEN.
George Brown and Richard L. Dobson, (Ore. U., Med. School, Div. of Dermatol., Portland).
Journal of Applied Physiology, vol. 23, Jul. 1967, p. 97–99. 7 refs.
Contracts DA-49-193-MD-2176 and DA-49-193-MD-2184; Grants AM-05655 and NIH 5-II-AM-5300.

Thermal sweating was studied in ten normal women. The sweat rates, the range of sodium excretion, the sodium concentration of the secretory fluid, maximal ductal free water clearance, and water-free sodium reabsorption in these women were within the range previously found in normal men.

A67-81318
THE BIOLOGICAL EFFECTS OF OZONE ON MAN AND ANIMALS.
Louis S. Jaffe (HEW, Natl. Center for Air Pollution Control, PHS, Washington, D. C.).
American Industrial Hygiene Association Journal, vol. 28, May–Jun. 1967, p. 267–277. 75 refs.

Recent literature on the effects of ozone exposures on man and animals is reviewed, with emphasis on the effects of low concentrations of ozone (0.05 to 0.20 p.p.m.). Irritation of the mucous membranes of the upper respiratory tract, a decrease in visual acuity and other changes in ocular parameters, an enhancement in mortality of respiratory infected test animals, the sphering of red blood cells, structural changes in the nuclei of myocardial tissue, and an increase in mortality of newborn animals have been reported within this range. At higher concentrations (0.6 to 0.8 p.p.m. for two hours), ozone will interfere with lung function for the duration of exposure and beyond. Other effects of ozone include distinct respiratory distress, coughing, choking and severe fatigue, which occur at concentrations at or below 1.0 p.p.m. (the maximum level of ozone ever measured in dense atmospheric photochemical air pollution).

A67-81319
LATERALITY EFFECTS IN DICHOTIC LISTENING.
Susan Oxbury, John Oxbury, and Jane Gardiner (Churchill Hosp., United Oxford Hosp., Dept. of Neurol., Oxford, Great Britain).
Nature, vol. 214, May 13, 1967, p. 742–743. 5 refs.
Mental Health Res. Fund supported research.

In one test, two groups of 13 subjects each listened to ten series of digits presented dichotically. The average error scores for each group were divided according to channel and ear laterality. Analysis of variance of the data showed no significant difference between right ear and left ear performance. No significant difference was shown between groups, but there was a significant difference between the channels. The results indicated that performance of the right ear depended on the recall conditions to a considerably greater extent than in the case of the left ear. It was pointed out that in free recall, subjects performed better on the ear recalled first. In a second test, 22 subjects listened to relevant stimuli in one ear and irrelevant stimuli in the other ear. Errors were greatest when irrelevant material was entering the right ear. In the past little consideration was given to attention as a factor determining the superior recall of verbal material entering the right ear when different material is presented to the two ears simultaneously. Results from the present experiments suggested that an attentional bias towards the right ear may explain the apparent right ear superiority when free recall is allowed.

A67-81320
SONIC BOOM EFFECTS ON MEN [EFFETS SUR L'HOMME DU BANG SONIQUE].
R.-E. Bouillé.
Revue des Corps de Santé des Armées, vol. 7, Oct. 1966, p. 659–688. 54 refs. In French.

A discussion is presented on the historical aspects and the physical phenomenon of sonic boom associated with supersonic flight. Sonic boom is a natural but undesirable consequence of all supersonic flight and cannot technically be eliminated in the immediate future. Among the many preventative suggestions presented, the only possible solution for decreasing the sonic dammages appears to center around the control of flight plans, increasing the altitude in case of acceleration or other maneuvers. No evident direct relation between the shock waves from sonic boom received on the ground and body injury has been presented. Various psychological reactions of individuals to sonic boom concern its effects on individual behavior, emotions, interference with sleep, rest and relaxation, interruption of conversation, radio and TV, shaking of homes and startling persons. Factors affecting the reaction of persons to supersonic noise are socio-cultural, geographic and ecological.

A67-81321
NONUNIFORM PULMONARY DIFFUSION CAPACITY MEASURED BY SEQUENTIAL CO UPTAKE AND WASHOUT.
Charles Mittman (Chicago U., Dept. of Med., Ill. and Baltimore City Hosp., Natl. Inst. of Child Health and Human Develop., Gerontol. Branch, Md.).
Journal of Applied Physiology, vol. 23, Jul. 1967, p. 131–138. 11 refs.
Grants PHS FR00013 and PHS 5-F2-He-30,482-02.

Conventional methods for measuring pulmonary diffusing capacity (D_L) can yield erroneous results when applied to the nonuniform lung. This paper describes a technique for assessing diffusion nonuniformity, the uptake washout method, and illustrates its application to computer model-generated data. The method employs a computer analysis of steady-state CO uptake and CO- and He-washout data. Representing the lung

as a two-compartment ventilation and diffusion system, the method identifies the range of over-all D_L values and compartment characteristics which are compatible with the data. In the presence of diffusion-volume nonuniformity, D_L is precisely defined. With diffusion-ventilation nonuniformity the data can be consistent with a variable D_L. It is concluded that this approach, by identifying instances in which a range of D_L values can explain the data, is more realistic than the D_L methods currently employed.

A67-81322
FIXED-INTERVAL BEHAVIOR MAINTAINED BY CONDITIONED REINFORCEMENT.
John de Lorge.
Journal of the Experimental Analysis of Behavior, vol. 10, May 1967, p. 271–276. 9 refs.
NASA Grant NsG-446 and Grant NIH MH 13153-01.

The key-pecking of a pigeon was reinforced with grain on an 18-min. second-order schedule. During the 18 min., a key peck which completed a 3-min. fixed interval produced a stimulus of 0.5-sec. duration. The first 3-min. fixed interval completed after 18 min. resulted in primary reinforcement. Behavior characteristic of fixed-interval schedules was produced on both the 3-min. components and the 18-min. schedule. This performance was shown to be enhanced whenever the 0.5-sec. stimulus was also presented before the presentation of grain.

A67-81323
ISOLATED E.C.G. DISORDERS OF REPOLARIZATION IN AIRCREW MEMBERS [LES TROUBLES E.C.G. ISOLES DE LA REPOLARISATION CHEZ LES MEMBRES DU PERSONNEL NAVIGANT].
M.-J. Nicolas, R. Quemerc'h, and R. Carre (Centre d'examen principal du personnel navigant de l'aéron., Serv. méd. et cardiol., Paris, France).
Revue des Corps de Santé des Armées, vol. 7, Oct. 1966, p. 735–750. 25 refs. In French.

Fifty case histories are reviewed of electrical abnormalities in the electrocardiogram (ECG) changes of ST segment and T wave, which occurred between 1963–1965 in a population of 6,000 French civilian and military flying personnel. A study is included of the behavior of these alterations under the influence of various function tests (effort, anoxia in a decompression chamber) or pharmaeodynamic (ingestion of potassium, injection of ergotamine tartrate). These methods were of no value in diagnosing any coronary disorder indicated by the electrical abnormality. It appears that abnormalities occur most frequently in obese persons (15 times in 25 cases in a population of 3,445 flyers). The following general rules are suggested for flight surgeons to follow whenever ECG abnormalities appear: (1) during admission examination, whenever the abnormalities of repolarization are patent and not correctable by the function tests a decision of temporary unfitness for flight duty must be rendered, at least for several months; and (2) during review medical examinations, a decision of unfitness is given if the least doubt exists about coronary integrity.

A67-81324
EXPERIMENTAL RESULTS CONCERNING THE ELECTRO-PHYSIOLOGICAL STUDY OF THE VESTIBULAR APPARATUS IN THE COURSE OF ACOUSTIC AND KINETIC STIMULATION IN ANIMALS: THEIR AERONAUTIC AND AEROSPACE INCIDENCE [RESULTATS EXPERIMENTAUX CONCERNANT L'ETUDE ELECTRO-PHYSIOLOGIQUE DE L'APPAREIL VESTIBULAIRE AU DOURS D'AGRESSIONS ACOUSTIQUES ET CINETIQUES CHEZ L'ANIMAL: LEURS INCIDENCES AERONAUTIQUES ET AEROSPATIALES].
M. Burgeat, A.-P. Gibert, G. Freyss, and P. Fontelle.
Revue des Corps de Santé des Armées, vol. 7, Oct. 1966, p. 707–719. In French.

In order to demonstrate the stimulation of the vestibular apparatus under the effect of labyrinthine fluid pressure changes due to intense pure sounds, a study was made of the activity of central vestibular pathways in guinea pigs subjected to kinetic and acoustic stimuli. Electrodes were implanted in cerebellar regions (floculo-nodular lobe, garrett nucleus, and anterior lobe). Under certain conditions, very intense sound stimuli were capable of producing an increased vestibular activity at the level of the cerebellar zones. A second experiment was performed to ascertain the effect of acoustic and kinetic stimuli on the vestibular apparatus of gerbils utilizing the electronystagmographic method. Electrodes were placed at the levels of the anterior and posterior commisures of the animals eye. The results obtained during acoustic stimulation were similar to those obtained from the above experiment indicating that aerial vibratory aggresion affects the vestibular apparatus. The effects of kinetic stimuli on the vestibular apparatus were obtained by (1) centrifugal force applied to semicircular canal fluids and ampulae; and (2) by repetitive and prolonged rotations around a vertical axis. In the first case the absence of centrifugally induced nystagmus indicated that it was a non-injurious type of stimulation. On the contrary, in the second case the axis of rotation was very near the labyrinth (horizontal canals) and the resulting disorders of nystagmus indicated that it was dangerous for the labyrinth to be stimulated in this manner in a repetitive and prolonged fashion. Vestibular fatigue is suggested and perhaps even dangerous to the balance of persons subjected to these kinetic stimuli.

A67-81325
THE SUPPLEMENTARY VALUE OF ALGAE PROTEIN IN HUMAN DIETS.
Sunghee Kim Lee, Hazel Metz Fox, Constance Kies, and Richard Dam (Neb. U., Depts. of Food and Nutr. and Biochem. and Nutr., Lincoln).
Journal of Nutrition, vol. 92, Jun. 1967, p. 281–285. 15 refs.

Nutritive value of algae protein for maintaining nitrogen balance in human adults fed 6 g. N/day from algae alone or algae combined with other intact proteins was determined during ten experimental periods of five days each. The protein sources studied were: algae (*Chlorella pyrenoidosa*), fish flour, soybean flour, dried whole egg, rice and gelatin. All diets supported positive nitrogen balance (mean values ranging from +0.30 to +0.77 g. N/day), except the diets containing algae alone or algae and gelatin (mean values, −0.06 and −0.38 g. N/day, respectively). While the intact proteins of fish, soybean and egg fed singly resulted in nitrogen retentions of similar magnitude, only fish protein appeared to be improved slightly by supplementing with 2 or 4 g. nitrogen from algae. Nitrogen retention in response to the algae-rice combination was comparable to that observed when the high quality proteins, fish, soybean and egg were fed. Apparent nitrogen

digestibility for the 6 g. algae nitrogen diet was improved from 66% to 71 to 75% when part of the algae was replaced by other proteins. The latter values compared favorably with digestibilities of the single intact proteins.

A67-81326
DEVELOPMENT OF CONTRACTUAL NORMS IN A DYAD.
Peter Murdoch (N.C. U., Chapel Hill).
Journal of Personality and Social Psychology, vol. 6, Jun. 1967, p. 206–211. 7 refs.
Contract Nonr-855(04).

This study investigated some circumstances leading to the development of norms which reduce threats to the continued existence of a profitable dyadic relationship. Pairs of subjects played a bargaining game in which one person was given the power to divide the joint rewards of the pair, while the other person had the power to leave the relationship for an attractive alternative. Pairs were given opportunities to form contractual norms specifying rules of fairness and loyalty. Perceptions of the unfairness of the reward divider and the disloyalty of the other member, as well as the precision with which the reward divider could allocate joint outcomes, were varied in a $2 \times 2 \times 2$ factorial design. Twelve dyads were run in each of the eight conditions. The major predictions were confirmed. When the reward divider had precise control over the division of joint rewards, an Unfairness X Disloyalty interaction was found. Dyads formed the greatest number of contractual norms when the reward divider was presented as likely to exploit and when the other member was presented as likely to withdraw from the relationship. Where the reward divider had only imprecise control over the division of joint outcomes, the frequency of contracts was generally higher than in the precise control conditions.

A67-81327
TIME COURSE OF OXYGEN CONSUMPTION IN RATS DURING SUDDEN EXPOSURE TO HIGH ENVIRONMENTAL TEMPERATURE.
M. K. Yousel and H. D. Johnson (Mo. U., Dept. of Dairy Husbandry, Columbia).
Life Sciences, vol. 6, Jun. 1, 1967, p. 1221–1228. 21 refs.
Grant DEEFPR EF 00226-08.

Determination of O_2 consumption of three groups of rats (2, 7 to 8 and 16 months old) following sudden exposure to heat (34°C.) demonstrated that: (a) O_2 consumption increased significantly in the three groups after exposure to 34°C. This increase was sustained for 48 to 72 hr. (b) At 48 to 72 hr. after exposure, O_2 consumption was returned to normal (28°C. values) and continued to decline significantly below the normal values when data were expressed per animal. (c) O_2 consumption increased for less than 48 hr. in young rats (2 and 7 to 8 months old) and remained elevated for a longer period (72 hr.) in the older rats (16 months). This indicated that the young animals acclimate to 34°C. temperature earlier than older animals. The findings characterize the metabolic trends in the sequence of the adjustment changes or acclimation of rats exposed to environmental heat. The data presented indicated that temperature and metabolic rate interrelationships depend on time of temperature exposure.

A67-81328
EFFECT OF TRANSLOCATION TO 3,800 M ALTITUDE ON GLYCOLYSIS IN MICE.
F. Duane Blume and Nello Pace (Calif. U., Dept. of Physiol., Berkeley and White Mt. Res. Sta., Bishop).
Journal of Applied Physiology, vol. 23, Jul. 1967, p. 75–79. 14 refs.
Contract Nonr 3656(25).

After variable short-term effects, continuous exposure to an altitude of 3,800 m. for 30 days or longer resulted in a 50% increase in hematocrit values, a reduction of 50% in liver glycogen content, and a 25% reduction in blood sugar values in adult laboratory mice. A significant reduction in daytime carbon 14-labeled glucose conversion rate of $^{14}CO_2$ was observed after a 30-day exposure to altitude. On the other hand, the conversion rate of labeled glycerol, pyruvate, acetate, and succinate to $^{14}CO_2$ was found to be nearly identical to that at sea level. No difference was observed between sea-level and altitude mice in the glucose conversion rate at night. The total energy metabolism was found to be unchanged during the altitude exposure. The more rapid release of label from glucose-I-^{14}C than from glucose-6-^{14}C normally observed at seal level was not noted at altitude. The data presented in this study demonstrate a decreased rate of conversion of glucose to CO_2, and the possibility of diminished hexose monophosphate shunt activity.

A67-81329
SPATIAL INTERACTION IN HUMAN CONE VISION.
Gerald Westheimer (Calif. U., Neurosensory Lab., Berkeley).
Journal of Physiology, vol. 190, May 1967, p. 139–154. 18 refs.
Contract Nonr 222(82) and Grant NIH NB-03154.

The adaptation state of a uniformly illuminated patch of human cone retina was determined by finding the threshold for a small, brief light spot seen flashing in its center. When the illuminated patch of the retina was increased in diameter, the adaptation state was first raised, and beyond a critical background diameter, lowered. This was interpreted as a manifestation of excitatory and inhibitory interaction of adaptation stimuli: illumination of retinal regions in the immediate neighborhood of the area tested acted to raise the adaptation level, and of those further removed acted to lower it. The critical area beyond which adapting light produced inhibition was about five min. of arc in diameter in the eye's object space for foveal observation. For peripheral cone vision it increased much as the minimum angle of resolution. The inhibiting action of outlying areas was substantially reduced, or perhaps even eliminated, by lowering the background luminance. Surrounding the retinal patch with a pair of juxtaposed narrow concentric black and white rings superimposed on a uniform field, simulating a border, irrespective of diameter, did not influence the threshold of the probing spot. This argues against a possible threshold raising effect of the border of the background. The inhibiting action on a patch of cone retina of a surrounding annulus occurred only when the annulus was seen by the same eye and not when it was seen by the other eye: the site of inhibitory interaction is, therefore, retinal.

A67-81330
THE EFFECT OF WITHDRAWAL OF VISUAL PRESENTATION OF ERRORS UPON THE FREQUENCY SPECTRUM OF TREMOR IN A MANUAL TASK.
G. G. Sutton and K. Sykes (Roy. Radar Estab., Malvern, Worcestershire, Great Britain).
Journal of Physiology, vol. 190, May 1967, p. 281–293. 7 refs.

When a subject attempts to exert a steady pressure on a joystick he makes small unavoidable errors which, irrespective

of their origin or frequency, may be called tremor. Frequency analysis shows that low frequencies always contribute much more to the total error than high frequencies. If the subject is not allowed to check his performance visually, but has to rely on sensations of pressure in the finger tips, etc., the error power spectrum plotted on logarithmic co-ordinates approximates a straight line falling at six db./octave from 0.4 to 9 c.p.s. In other words the amplitude of the tremor component at each frequency is inversely proportional to frequency. When the subject is given a visual indication of his errors on an oscilloscope, the shape of the tremor spectrum alters. The most striking change is the appearance of a tremor peak at about nine c.p.s., but there is also a significant increase of error in the range 1–4 c.p.s. The extent of these changes varies from subject to subject. If the nine c.p.s. peak represents oscillation of a muscle length-servo it would appear that greater use is made of this servo when positional information is available from the eyes than when proprioceptive impulses from the limbs have to be relied on.

A67-81331
THE RELATION BETWEEN SPONTANEOUS ACTIVITY, METABOLIC RATE AND THE 24 HOUR CYCLE IN MICE AT DIFFERENT ENVIRONMENTAL TEMPERATURES.
L. E. Mount and Jane V. Willmott (A.R.C. Inst. of Animal Physiol., Babraham, Cambridge, Great Britain).
Journal of Physiology, vol. 190, May 1967, p. 371–380. 12 refs.

Oxygen consumption rates (as the measure of metabolic rate or heat production) and levels of spontaneous activity were recorded simultaneously for mice, both singly and in groups, over 24 hr. periods at temperatures ranging from 8 to 37°C. There was marked 24 hr. variation in both metabolic rate and activity, with maxima during the night; the amplitude of the variation diminished at the lower environmental temperatures. At 28–33°C. environmental temperatures, increased activity was associated with an increased oxygen consumption rate. At 8 and 15°C., increased activity was accompanied by only a small increase in oxygen consumption. These results show that thermogenesis from spontaneous activity can take the place of thermoregulatory heat production in the cold.

A67-81332
OPHTHALMOPATHOLOGY OF AIR BLAST [OPHTALMOPATHOLOGIE DU "COUR D'AIR"].
G. Raynaud, G. Perdriel, and P. Manent (Centre principal d'examen du personnel navigant de l'aéron. and Hôp. mil. d'instr. D. Larrey à Versailles, Serv. "ophthalmol.", Paris, France).
Revue des Corps de Santé des Armées, vol. 7, Oct. 1966, p. 751–754. In French.

A case history is reported of an airport controller with a chronic pseudo-tumoral inflamation in the temporal bulbar conjunctiva of the right eye. The disorder was due to the presence of minute sand particles thrown against the eye by an air blast from aircraft engines. The pathogenesis, pathology, and treatment are discussed.

A67-81333
PROBLEMS OF SPACE MEDICINE: MATERIALS OF CONFERENCE, MAY 24–27, 1966 [PROBLEMY KOSMICHESKOI MEDITSINY MATERIALY KONFERENTSII (24–27 MAIA 1966 G.)].
Edited by V. V. Parin.
Moscow, Min. of Health, 1966, 414 p. Many refs. In Russian.

The congress proceedings include 278 condensed reports covering every topic of the aerospace medicine. The material can be grouped into several general topics: (1) The effect on humans of conditions, such as acceleration, weightlessness, vibration, magnetism, and radiation and the resultant changes in the physiology and biochemistry of the body. (2) The effect of the same factors on various organs and systems, with a particular stress on the visual and auditory systems. (3) The use of the pharmacological aids in prophylaxis of these effects; radiation protectors in particular. (4) Estimation of body radiation burden, and the use of shielding. (5) Effects of ambient conditions, such as use of helium, noise, variations in temperature and pressure, air ionization, bacterial shedding, and limitation of space on health and performance. (6) Effects of hypokinesia, dehydration, bone decalcification and electrolyte imbalance. (7) Effect of social isolation on nervous system, sleep, concentration on tasks, speech and memory. (8) Degradation of body waste by chemical means and biological systems for reuse by crew members. (9) Nutrition and food supply, particularly the use of algae, as an indirect system of recovery by further reconversion into organic source through maintaining fish on board. (10) Medical support. (11) Selection of astronauts, training and adaptation. (12) Motion sickness, nystagmus, and coriolis stress. (13) After-flight adjustment upon return to the terrestrial conditions. (14) Automatic and manual control of spacecraft. (15) Data processing, use of computer systems and application of the information theory. (16) Space accidents, and mutation.

A67-81334
SYSTEMIC ARTERIAL BLOOD PRESSURE AND PULSE RATE IN CHRONICALLY RESTRAINED RHESUS MONKEYS.
Ralph P. Forsyth and Ronald Baireuther (Calif. U., San Francisco Med. Center, Cardiovascular Res. Inst.).
American Journal of Physiology, vol. 212, Jun. 1967, p. 1461–1463. 5 refs.
Grants PHS HE-06285, PHS FR-00122, and PHS 1-K3-HE-12,974-02.

Systemic arterial blood pressure and pulse rate were measured once each hour in 13 restrained, unanesthetized rhesus monkeys with implanted intra-arterial catheters. Pressures and pulse rates (average of 24 measurements/day) were generally higher during the week after surgery and introduction to the restraining chair than during subsequent weeks (2–34 wk). Mean systemic arterial pressures, exclusive of the first week, varied from 117 to 136 mm. Hg systolic, 71 to 84 mm. Hg diastolic; pulse rate varied from 118 to 160 beats/min. Mean plasma levels of epinephrine were 0.3 μg/liter (SD = 04.), of norepinephrine, 0.9 μ/liter (SD = 0.4).

A67-81335
BRONCHIAL CIRCULATION IN HIGH ALTITUDES.
Vicente Zapata-Ortiz, Ramiro Castro de la Mata, Enrique Fernández, Arturo Geu, and Luis Batalla (U. Peruana Cayetano Heredia, Lima, Peru).
American Journal of Physiology, vol. 212, Jun. 1967, p. 1464–1468. 25 refs.
Grant NHI HE 08732-02.

Bronchial circulation and bronchopulmonary anastomoses were studied in two groups of sheep native to the high Andes (above 4,000 m.) and to the Peruvian coastal plain. The high altitude-adapted animals showed a decreased bronchial arterial flow as well as a reduction in the bronchopulmonary anastomotic flow going from the bronchial artery to the pulmonary circuit. Using indicator-dilution method, the existence of bronchopulmonary anastomotic flow from the pulmonary circuit

to bronchial veins has been demonstrated in both groups of animals. The pharmacological responses of the bronchial circulation of the sheep are similar to those reported for other animal species.

A67-81336
ALTERATION OF MYOCARDIAL PERFORMANCE DURING THERMAL STRESS BY BETA ADRENERGIC BLOCKADE.
Charles W. Urschel (Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).
American Journal of Physiology, vol. 212, Jun. 1967, p. 1497–1502. 22 refs.

Myocardial performance was studied in awake dogs to evaluate the effect of beta adrenergic blockade on increases in cardiac output and contractility previously reported during thermal stress. Four dogs with implanted aortic root flow probes and left ventricular pressure catheters were studied twice at 50°C. for 2 hr. The cardiovascular response was modified during the second study by the induction of beta adrenergic blockade using Mead Johnson compound MJ 1999. Direct comparison of data from the two runs showed that under otherwise identical thermal stress, beta blockade caused an 18% decrease in heart rate, no change in cardiac output, and a 21% increase in stroke volume. Peak power decreased in three dogs despite an increase in left ventricular end diastolic pressure. In the fourth dog, dP/dt fell despite an increase in peak pressure, power, stroke volume, and end-diastolic pressure. Beta adrenergic blockade thus decreased heart rate and myocardial contracility but had little effect on the total cardiac output response to the stress.

A67-81337
RESPONSE SELECTION IN KEEPING TRACK OF SEVERAL THINGS AT ONCE.
D. B. Yntema and G. M. Schulman (M.I.T., Lincoln Lab., Cambridge, Mass.).
(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).
Acta Psychologica, vol. 27, 1967, p. 325–332. 7 refs.
USAF supported research.

Keeping track of the current states of several variables has been found to be more difficult when the states of all variables are drawn from the same category than when the states of different variables are drawn from different categories. The present experiment rejected some alternative explanations and concluded that the subject's superior performance in the case of different categories may be ascribed entirely to response selection; when there are different categories, he can sometimes dismiss a tentative response as impossible. Harris' Discriminant Rule was found to give an adequate quantitative description of the effect of constraining the subject's response in this way.

A67-81338
AUDITORY AND VISUAL STORES IN SHORT TERM MEMORY.
B. B. Murdock, Jr. (Toronto U., Dept. of Psychol., Canada).
(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).
Acta Psychologica, vol. 27, 1967, p. 316–324.
Grants NSF GB 4545 and NRC, Canada APA 146.

Three experiments were conducted to investigate the modality effect in short term memory. The first experiment used paired associates, and found larger differences between auditory and visual presentation when verbalization at the time of presentation was eliminated. The second and third experiments used serial lists; the modality effect was obtained over the full retention period but seemed most pronounced when both the probe and the correct response (i.e., the following word) were auditory. The data support the previous contention that, in short term memory, retrieval can be from a preperceptual sensory store. Modality differences can be very large, and they seem to argue against the notion that the function of the list presentation is merely to tag words for later retrieval. In the mixed-mode experiment, switching of attention may be involved, but it alone does not seem adequate to explain the results obtained.

A67-81339
SOME ADDITIVE RESULTS IN SHORT TERM MEMORY.
G. J. Harrison (Sheffield U., Dept. of Psychol., SRC Unit, Great Britain).
(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).
Acta Psychologica, vol. 27, 1967, p. 306–315. 9 refs.
Grant S.R.C. 4220.

The recall of multiattributive lists by 40 subjects is reported. In the experiment a multiattributive list was one in which both values of 2, 3, or 4 binary attributes (e.g. attribute Side with values Left, Right) appeared twice over all four list items. Relevant recall concerned only attributes for which both binary values appeared. It was found that performance for three attributes when four were relevant could be predicted. The basis of these predictions was an additive approach. It involved overall performance with lists in which four attributes were relevant at recall, and, performance with separate attributes of lists in which only three attributes were relevant at recall.

A67-81340
RECOGNITION MEMORY AND REACTION TIME.
R. E. Morin, D. V. Derosa, and V. Stultz (Kent State U., Ohio).
(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).
Acta Psychologica, vol. 27, 1967, p. 298–305.
Grant NSF GB-4343.

Sternberg has proposed that recognition memory involves a serial and exhaustive search process. It is presumed that a representation of the test stimulus is successively compared to representations of every item in a to-be-remembered set. One prediction from the theory is that reaction time (RT) to a stimulus probe should not be a function of the serial position of the probed item within the set to be remembered. This prediction was tested in a recognition memory task. The prediction was not confirmed in that RT was markedly influenced by the serial position of items to be recognized. Especially significant was a large recency effect evidenced by most rapid recognition of the most recently presented item. Alternative interpretations of the data are considered.

A67-81341
EXTRATERRESTRIAL RADIATION AND SPACE EXPLORATIONS [RAYONNEMENTS EXTRA-TERRESTRES ET EXPLORATIONS SPATIALES].
Roland-Paul Delahaye (Hôp. Mil. d'instr. D. Larrey à Versailles, Serv. électro-radiol., France).
Revue des Corps de Santé des Armées, vol. 7, Oct. 1966, p. 689–705. In French.

A study is presented of the physical characteristics of cosmic galactic radiation; Van Allen belt radiations; artificial best radiations; and solar cosmic radiations. Described is the composition, energy, intensity, variations of intensity, and

origin of these extra-terrestrial radiations. Illustrative tabulations and graphs are provided including those dealing with the principal of radiation dangers; dose of cosmic and cosmic galactic radiations in function of geomagnetic latitude and altitude; internal and external zones of the Van Allen belt; and energy of proton/electron particles; and maximal intensity.

A67-81342
ENTRAINMENT AND THE PRIMATE CIRCADIAN RHYTHM.
T. E. Levere (Henry Ford Hosp., Dept. of Neurol. and Psychiat., Detroit, Mich.).
Psychonomic Science, vol. 8, Jun. 15, 1967, p. 199–200. NASA Grant NASr-83.

An adult male Nemestrina monkey was used as a subject in a study attempting to relate the performance of a simple operant schedule of reinforcement to two separate physiological indicants of the primate circadian rhythm. The existence of a 23-hr. periodicity in the free-running Nemestrina circadian rhythm is confirmed. This rhythm exerts considerable influence on simple entrained operant behavior.

A67-81343
EFFECT OF NEONATAL THYMECTOMY ON THE DEVELOPMENT OF OZONE TOLERANCE IN MICE.
Arthur R. Gregory, Lyman A. Ripperton, and Bradford Miller (N.C. U., School of Public Health, Dept. of Environ. Sci. and Eng., Chapel Hill).
(Am. Ind. Hyg., Conf., Houston, Tex., May 37, 1965).
American Industrial Hygiene Association Journal, vol. 28, May–Jun. 1967, p. 278–282. 16 refs.

Male white Swiss mice, thymectomized at birth, were unable to develop tolerance to ozone when pre-exposed to sublethal concentrations of 0.3 and 5.0 p.p.m. of ozone for one hour. On the other hand, tolerance was readily induced in sham-operated animals. Thus the thymus appears to be necessary during maturation for the development of tolerance to ozone. No statistical difference in mortality was shown between mice pre-exposed to 0.1 p.p.m. of ozone and those not so pre-exposed, despite the fact that a larger number of pre-exposed animals survived compared to those not pre-exposed.

A67-81344
THE C. W. LASER, AS A STIMULATOR IN ELECTRORETINOGRAPHY.
Giovanni Del Signore.
Atti della Fondazione Giorgio Ronchi e Contributi della' Istituto Nazionale di Ottica, vol. 22, Mar.–Apr. 1967, p. 190–194. In Italian.
Contract USAF F6 1052 C 0067.

In vivo electroretinographic responses are difficult to obtain from a small retinal area when using conventional light sources due to scattered light, which also excites the receptors that are outside the focal area. One solution to this problem might be the use of a continuous wave laser as a light source for the stimulator. Its main advantage is provision of an extremely narrow beam (0.5 mm. or less in diameter, at the pupil) of coherent and monochromatic light greatly decreasing the number of diffusing cells and molecules in the path of the light source. Sizeable extrafoveal responses were recorded only at the maximum intensity used which agrees with the view that the laser beam excites only the cones. Some data were given for comparison of records using the laser and using white light (incandescent lamp).

A67-81345
THE EFFECTS OF HYPOXIA ON SHUTTLE AVOIDANCE IN THE RAT.
Frank Ledwith (Adelaide U., Dept. of Psychol., Australia).
Psychonomic Science, vol. 8, Jun. 15, 1967, p. 203–204. 8 refs.

Four groups of six rats each were tested on the acquisition of shuttle avoidance at one of four levels of oxygen concentration between 21% (normal air) and 90%. Initially performance was poorer at 9% though with repeated testing the differences between the groups diminished. Subsequent testing of all groups at 9% O_2 gave evidence that the reduction in the effect of oxygen deprivation could be attributed in part to physiological adaptation i.e., acclimatization.

A67-81346
SELECTION OF SENSORY INFORMATION IN CONTROL OF PURSUIT EYE MOVEMENTS.
Adam Atkin (Mount Sinai Hosp., Dept. of Neurol., New York City, N. Y.).
Psychonomic Science, vol. 8, Jun. 5, 1967, p. 133–134. 7 refs.
Grant NIH NB 04576.

Subjects performed fixation shifts between moving and stationary targets that were presented against a visually complex background. Post-saccade pursuit latencies were far shorter than the response lags previously reported for the pursuit control system. This is interpreted as evidence for control of initial post-saccade pursuit velocity by pre-saccade image velocity information selected from a limited region of peripheral retina.

A67-81347
THE EFFECT OF CHANGE OF TARGET FIELD LUMINANCE AND COLOUR ON FIXATION EYE MOVEMENTS.
P. R. Boyce (Reading U., J. J. Thomson Phys. Lab., Great Britain).
Optica Acta, vol. 14, Jul. 1967, p. 213–217. 7 refs.

Median saccade and drift magnitudes, mean intersaccadic intervals and overall areas of fixation were calculated for fixation of a four min. arc diameter black spot. All these quantitites were found to be invariant for target field luminances in the range 800 ft L to 8 ft. L and for target field colors, red, blue and white.

A67-81348
SUPPRESSION DURING BINOCULAR FUSION OF COMPLEX TARGETS.
Robert Fox and Curtis McIntyre (Vanderbilt U., Nashville, Tenn.).
Psychonomic Science, vol. 8, Jun. 5, 1967, p. 143–144.
Grant PHS MH 08934.

Forced-choice form recognition thresholds were obtained for both eyes concurrently during fusion of targets varying in contour density. For targets with many contours, decrements in recognition were found which were consistent with the assumption that suppression during fusion occurs when the targets have complex configurations. The results support a modified form of the suppression theory.

A67-81349
CHANGES IN THE EFFECTS OF FIXATION UPON APPARENT DISTANCE IN THE THIRD DIMENSION.
Robert H. Pollack (Inst. for Juvenile Res., Chicago, Ill.).
Psychonomic Science, vol. 8, Jun. 5, 1967, p. 141–142. 7 refs.
Grant NICHHD HD 01433.

One hundred sixty children, kindergarten through seventh grade, were tested to determine the effects of fixation on the

apparent distance from subject of objects in space. Children in grades 1–7, like adults, moved a comparison stimulus away from themselves to match a standard after a period of exposure to the standard above. Kindergarten children displaced toward themselves. Displacement was correlated with chronological age, but not with mental age or interpupilary distance. According to the ontogenetic application of the sensory-tonic theory of perception, the younger children assimilate sensory stimulation from the extraocular muscles involved in convergence as part of their visual experience. Older children apparently compensate for these cues.

A67-81350
EFFECT OF HUNGER DRIVE LEVEL ON HUMAN LEARNING.
Ann K. Wolfgang (Pa. State U., University Park).
Psychonomic Science, vol. 8, Jun. 5, 1967, p. 155–156. 6 refs.

Two paired-associate learning experiments, using homogeneous and heterogeneous lists, tested the H×D theory with hunger manipulated as drive and normative word association strength the index of habit strength. Results showed no significant differences in learning associated word pairs by Hungry subjects and Control subjects. Consistent, but not statistically significant, evidence was found that, as predicted, Hungry subjects made more errors on competitive pairs than did Control subjects.

A67-81351
LOCALIZATION OF SOUND FOLLOWING BINAURAL INTENSITY IMBALANCE.
Lloyd F. Elfner and David R. Perrott (Kent State U., Ohio).
Psychonomic Science, vol. 8, Jun. 5, 1967, p. 145–146.
Grant NIH MH 11181.

An experiment is reported on the effect of a 63 min. exposure to an intermittent 700 Hz. tone dichotically presented with a 50 db. interaural intensity imbalance, on the localization function for a 1,000 Hz. tone. While no absolute threshold shifts were noted for the 1,000 Hz. tone, significant changes were observed in the localization function.

A67-81352
THE CULTURE OF FREE PLANT CELLS AND ITS SIGNIFICANCE FOR EMBRYOLOGY AND MORPHOGENESIS.
F. C. Steward, Ann E. Kent, and Marion O. Mapes (Cornell U., Lab. for Cell Physiol., Growth and Develop., Ithaca, N. Y.).
IN: CURRENT TOPICS IN DEVELOPMENTAL BIOLOGY: VOLUME 1.
Edited by A. A. Moscona and Alberto Monroy.
New York, Academic Press, 1966, p. 113–154. 96 refs.
NIH supported research.
$12.50.

The culture of free plant cells provides an understanding of factors that control the development of sexually reproduced organisms from a single cell. Only cells of angiosperms were discussed in this review. Use was made of liquid endosperms which furnished the clue to vigorous growth of free cells and to their totipotent development. The stimuli which will permit the free cell to grow are provided by liquid endosperm such as that from coconut, *Aesculus,* or *Juglans* as a supplement to a basal medium. Chemicals such as 2,4-D, NAA, and IAA have been used in combination with coconut milk to stimulate growth and cell division. In cultures of carrot cells, an array of growth patterns have been observed. These patterns may affect the organization the culture takes. Complete plants may be cultured from these free cells. Examination of free cells cultivated from small secondary phloem explants showed patterns reminiscent of embryonic growth, and the carrot life cycle was repeatedly recapitulated starting from single cells. A striking example of totipotent nonzygotic embryonic development from free somatic cells of carrot occurred when cell suspensions were established from developing embryos. Plantlets developing from a single embryo of an immature seed of *Daucus carota* exhibited all stages of development. Other examples of angiosperms which have been cultured from free cells included *Coriandrum, Sium, Nicotiana, Arabidopsis,* and *Cymbidium.* The major point which was made was that the cell in its responses during development is conditioned by extrinsic factors, whereas in its free state it is able to give full play to its intrinsic potentialities. The lesson learned from culturing free plant cells is that any cell provided with the appropriate conditions for its growth and with the right balance or sequence of exogenous growth-regulating substances may recapitulate development and retraverse the events of embryogeny even without benefit of the environment of the ovule.

A67-81353
THE EFFECTS OF VERBAL LABELS ON THE RECOGNITION OF FORMS.
Richard C. Debold (Wesleyan U., Middletown, Conn.).
Psychonomic Science, vol. 8, Jun. 5, 1967, p. 161–162.

Ninety-six subjects learned paired-associates with adjectives as stimuli and reproduced forms as responses. Tests for recognition of one form, a stressful rhombus, were made after 30 sec., or 48 hrs., or 7 days. The meaning of the stimulus-word significantly influenced recognition. There was no time effect.

A67-81354
SUCCESSIVE APPROXIMATIONS TO A MODEL FOR SHORT TERM MEMORY.
G. Sperling (Bell Telephone Labs., Murray Hill, N. J.).
(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).
Acta Psychologica, vol. 27, 1967, p. 285–292. 7 refs.

Experimental data are considered from a simple task in which an observer looks at letters and then writes them down. Three models are proposed. Model 1 consists of only two components: a visual memory for the letters and a motor translation component to enable copying a visual memory onto paper. Model 1 is inadequate because the visual image is shown not to persist until the time of reproduction. Model 2 corrects this deficiency by incorporating the possibility of subvocal rehearsal of the stimulus letters and an auditory memory for the rehearsal. However, Model 2 cannot account for performance with extremely short duration images because of the limit on the maximum rehearsal rate. The critical improvement in Model 3 is a more detailed specification of scanning, recognition and rehearsal, including a form of memory which is inherent in the process of recognition itself. Model 3 accounts for these data and incidently gives rise to some interesting inferences about the nature of consciousness.

A67-81355
SHORT TERM MEMORY SYSTEMS IN HUMAN INFORMATION PROCESSING.
M. I. Posner (Ore. U., Eugene).
(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).
Acta Psychologica, vol. 27, 1967, p. 267–284. 68 refs.
Grant NSF GB 3939.

Three aspects of the role of memory in information processing were considered. Retention of images, preservation of verbal information over brief periods, and reactivation of material from long term store represent different senses in which the term short term memory has been used. The assumption that all of these involve a single system may be fruitful for some purposes, but may also lead to inappropriate generalizations. For example, it does not appear that imagery need be short term or that reactivated information is especially susceptible to interference. Nevertheless, a considerable amount is now known about each of these systems and both comparisons and contrasts may prove useful.

A67-81356
OBJECTIVE MEASUREMENT OF MENTAL LOAD.
J. W. H. Kalsbeek and R. N. Sykes (Jan Swammerdam Inst., Lab. of Ergonomic Psychol. T.N.O., Amsterdam, The Netherlands).
(Inst. for Perception RVO-TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17-20, 1966).
Acta Psychologica, vol. 27, 1967, p. 253-261. 13 refs.

The main lines of research of the Laboratory of Ergonomic Psychology T.N.O. at Amsterdam are: (1) the detailed study of deterioration of performance caused by what has been called distraction stress; and (2) physiological measurements as functions of increasing and decreasing quantity of information handled per time unit. It was hypothesized that distraction stress can simulate the effects of other kinds of stress insofar as these effects lead to reducing the information handling capacity. A simple repetitive task served to distract systematically the subject from carrying out a normal task by occupying his information handling capacity. The best physiological parameter found was the scored regularity of the heart rate pattern. Studies of the aspects of the dual task situation included: the effects of training and instructions and the effects of increasing demands in the primary task in a dual task situation on: (a) the total capacity spent at the performance of both tasks; and (b) the suppression of sinus arrhythmia measured by the tolerance method.

A67-81357
EVOKED RESPONSE AND REACTION TIME.
R. T. Wilkinson (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).
(Inst. for Perception RVO-TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17-20, 1966).
Acta Psychologica, vol. 27, 1967, p. 235-245. 23 refs.

It is now possible, by the use of computer averaging techniques, to record clear evoked responses to sensory stimuli from the human scalp. This paper reviews some recent experiments which have sought to correlate the patterns of such responses with reaction time to the stimuli concerned. The conclusion is that the amplitude of certain components of the evoked response does indeed correlate with reaction time and that this correlation is probably due to the influence of attentional factors upon the behavioral and physiological measures concerned.

A67-81358
QUANTIFICATION OF SHARED CAPACITY PROCESSING IN AUDITORY AND VISUAL DISCRIMINATION.
M. M. Taylor, P. H. Lindsay, and S. M. Forbes (Defence Res. Med. Labs., Toronto, Ontario, Canada).
(Inst. for Perception RVO-TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17-20, 1966).
Acta Psychologica, vol. 27, 1967, p. 223-229. 9 refs.

When two or more discriminations are processed together, either they proceed in parallel with the same efficiency as when either is processed along, or they may interfere with one another, and share the total available processing capability. Quantification of the capacity devoted to discrimination in the shared condition is possible using the additive properties of d'^2 deduced in this paper as a measure of discriminative performance. The total amount of processor capacity used for all discriminations in a shared process has been found to be approximately 85% of that used for any single discrimination performed alone. This proportion holds whether two auditory, two visual, one auditory and one visual, or two auditory and two visual discriminations are simultaneously attempted. The implication is that the discrimination processor has a finite capacity which may be deployed on either auditory or visual tasks, and that 15% of this capacity is required to control the sharing procedure.

A67-81359
SEQUENCES OF RESPONSES TO SIGNALS ENCODED IN TIME ONLY.
E. T. Klemmer (Bell Telephone Labs., Murray Hill, N. J.).
(Inst. for Perception RVO-TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17-20, 1966).
Acta Psychologica, vol. 27, 1967, p. 197-203.

Subjects attempted to press a single key once for each stimulus, for single stimuli occurring in rapid sequence at either regular or random time-intervals. For regularly occurring stimuli, rhythmic difficulties occur at rates of two or three per second. Random intervals between stimuli led to even poorer performance at the same rates. This finding may be explained by the longer reaction times for short intervals between stimuli.

A67-31360
A DYNAMIC MODEL OF TIMING BEHAVIOR.
J. A. Michon and N. J. L. van der Valk (Inst. for Perception RVO-TNO, Soesterberg, The Netherlands).
(Inst. for Perception RVO-TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17-20, 1966).
Acta Psychologica, vol. 27, 1967, p. 204-212. 12 refs.

Studies of tapping behavior have failed to incorporate the sequential aspects of the performance of subjects. A methodological frame (generating functions) and a model (a dynamic linear system with two parameters) are proposed to improve our descriptive and predictive power. An experimental evaluation of this model is given and shows a fairly good fit to stepwise changes in the rate of tapping: the model accounts for between 70 and 98% of the explainable variance in the data. One of the two parameters of the model appears to be a personal parameter, the other is a function of the average interval length, and therefore highlights the limitations of the linearity assumptions. Some possibilities of further application of the method are discussed.

A67-81361
TEMPORAL CONFUSIONS AND LIMITED CAPACITY PROCESSORS.
D. A. Norman (Calif. U., Psychol. Dept., La Jolla).
(Inst. for Perception RVO-TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17-20, 1966).
Acta Psychologica, vol. 27, 1967, p. 293-287. 13 refs.

Theories of limited channel capacity should have some implications on the temporal properties of information processing. Little experimental evidence on this topic is available. Four types of observations are mentioned: (1) The perception of a sequence of single auditory notes when the notes are

drawn from two different samples of frequencies. (2) The perception of very fast presented visual items. (3) The perception of very fast presented auditory items, some items being presented twice in succession. (4) The reversal error in short term memory experiments. Results of some informal investigations are presented, which demonstrate that resolution of time relations among stimuli depends not simply on temporal factors, but also on stimulus-properties.

A67-81362
VIGILANCE, ATTENTION, EXPECTATION AND CORTICAL EVOKED POTENTIALS.
M. Haider (Vienna U., Hyg. Inst., Austria).
(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).
Acta Psychologica, vol. 27, 1967, p. 246–252.
NASA Contract NsG-623, Grants NSF GB 1844 and NIH TW 00 156-02; Osterreichischer Forschungsrat supported research.

Computer-averaged evoked potentials were recorded to flashes and clicks from subjects performing vigilance tasks as well as tasks requiring selective attention, expectation and anticipation. Fluctuations in vigilance performance were accompanied by corresponding changes in evoked potentials. Missed signals showed lower evoked response amplitudes as detected signals. During selective attention responses were larger when attention was directed toward the stimuli. In the expectation studies an 'expectancy potential' could be demonstrated at the instants when the stimulus was expected but did not actually occur. On the other hand, the prominent negative peak of evoked responses appeared later, if the stimulus occurred earlier than expected.

A67-81363
AN EVALUATION OF FOUR METHODS OF MONITORING SIMULTANEOUS PRIMARY AND SECONDARY VOICE MESSAGES.
William E. Williams and Donald D. Young (Philco–Ford Corp., Palo Alto, Calif.).
Human Factors, vol. 9, Feb. 1967, p. 45–52. 15 refs.
Contract AF 04(695)-880.

Four methods of monitoring simultaneous primary and secondary voice messages were investigated in high and low ambient noise environments. Two of the methods used a single earpiece headset and wall speaker, and two methods used a dual earpiece headset with either the primary message in one ear and the secondary message in the other ear, or the primary message in both ears and the secondary message in a single ear. A realistic script and operational setting were used to test the conditions using 54 trained subjects. The dual-headset methods were found to be significantly superior to the headset/speaker method in most scoring categories. No significant differences were found between noise levels. The findings are compared with previous research on multimessage monitoring.

A67-81364
SONAR TARGET DETECTION AS A DECISION PROCESS.
W. P. Colquhoun (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).
Journal of Applied Psychology, vol. 51, Apr. 1967, p. 187–190. 10 refs. Brit. Med. Res. Council supported research.

In a vigilance task which simulated sonar target detection, 12 subjects were required to report the occurrence of 200 msec. pulses in a 900 c.p.s. tone, which was continuously modulated in amplitude by a low-bandwidth noise source. In three 45-min. sessions subjects reported signals only when quite certain of their identification (Sure procedure); in a further three sessions they reported any signal-like sound (Unsure procedure). A substantially higher percentage of both "weak" and "strong" signals was detected with the Unsure procedure. False report rate was also higher with the Unsure procedure, but analysis showed that this reflected a change in decision criterion rather than in discrimination efficiency. Within-session decrement was slight, and unrelated either to signal strength or reporting procedure. The results support the contention that decision processes play a major role in determining performance at this kind of task.

A67-81365
EFFECT OF SIMULATED SOCIAL FEEDBACK ON INDIVIDUAL TRACKING PERFORMANCE.
William A. Johnston and Leon H. Nawrocki (Ohio State U., Columbus).
Journal of Applied Psychology, vol. 51, Apr. 1967, p. 145–151. 10 refs.
Grant AF-AFOSR-985-66.

Individual tracking performance was examined under conditions of simulated social feedback. Each of 60 subjects was told he had a partner and that posttrial feedback represented their team performance relative to average tracking ability. Actually, subject's feedback represented his individual performance relative to a lenient, moderate, or stringent criterion. These criteria simulated partners of varying ability. Subjects blamed their contrived partners for poor scores received under the stringent criterion. Performance of good trackers was not affected by criterion difficulty, but poor trackers performed best under the moderate criterion. The inhibitory influence of the stringent criterion was magnified during a terminal extinction session. The results suggest that criterion difficulty is an important determinant of performance in team and perhaps individual tasks.

A67-81366
EQUILIBRIUM AND VERTIGO IN A TILTING ENVIRONMENT.
Masaaki Kitahara and Ryoji Uno (Kyoto U., Fac. of Med., Dept. of Otorhinolaryngol., Japan).
Annals of Otology, Rhinology and Laryngology, vol. 76, Mar. 1967, p. 166–178. 9 refs.

The clinical symptoms of 66 patients who had been living in an environment tilted at various degrees were investigated. The major clinical symptoms were distinguishable in relation to the degree of inclination of the environments: (1) an unusual sensation at from 1° to 2°; (2) vertigo, headache, nausea, anorexia and fatigue at from 2° to 7°; (3) insomnia and increased fatigue, besides the above-mentioned syndrome, at from 7° to 9°. The symptoms were followed up during a five-month period. The symptoms largely disappeared during this period. However, insomnia and fatigue partially remained in some cases. In addition to the above-mentioned symptoms, equilibrium function and space perception in the tilted environment were also observed. The clinical symptoms, are considered to be mainly caused by the checking of the head-righting reflex due to the visual stimuli, and by the divisional force of gravity acting upon the circulatory system during sleep. Finally, with special respect to the tilting environment, the problems of motion sickness are discussed.

A67-81367
INNERVATION OF THE HUMAN COCHLEA.

Yasuya Nomura and Ichiro Kiri (Tokyo U., Dept. of Otorhinolaryngol., Japan).
Annals of Otology, Rhinology and Laryngology, vol. 76, Mar. 1967, p. 17–68. 21 refs.

The nerve fiber in the cochleae of aged people was studied using Holmes' silver impregnation and acetylocholinesterase staining methods. Nerves in the human cochlea were submitted for electronmicroscopical as well as histochemical studies. The present technique will bring additional new information on the morphology of the human cochlea. The course of the nerve fibers in the organ of Corti as well as the osseous spiral lamina was observed and discussed in reference to the afferent and efferent fibers. The medial fascicle, which possibly contained some, if not all, of the efferent fibers, crossed the tunnel of Corti obliquely apicalward and joined the external spiral bundles. The basilar fascicle, on the other hand, crossed basalward and coursed further basalward in the external spiral bundle, changing from one bundle to the other. Loss of nerve fibers was dominant in the lower turn of the cochlea, which enabled observation of the courses of single fibers. Study of presbycusis along this line is promising.

A67-81368
MODIFICATION OF THE CONDITIONED EMOTIONAL RESPONSE BY TREATMENT WITH SMALL NEGATIVE AIR IONS.
Allan H. Frey (Inst. for Res., State College, Pa.).
Journal of Comparative and Physiological Psychology, vol. 63, Feb. 1967, p. 121–125. 12 refs.
ONR and U.S. Army supported research.

From the hypothesis that treatment with small negative air ions causes a depletion of brain 5-hydroxytryptamine, it is predicted that a measure of mood or emotion will be affected by air ion treatment. The conditioned emotional response technique described by Brady provided the dependent variable. Results of two experiments, the second essentially a replication of the first, are in accordance with the prediction. The inhibition of response in the rat was reduced by treatment with small negative air ions, as it was with reserpine.

A67-81369
REACTION TIMES FOR SIMPLE SHAPE DISCRIMINATIONS REQUIRING ONE OR BOTH VISUAL CORTICES.
C. S. Brindley, R. H. S. Carpenter, and D. N. Rushton (Cambridge U., Psychol. and Physiol. Labs., Great Britain).
Quarterly Journal of Experimental Psychology, vol. 19, Feb. 1967, p. 70–72.

Reaction times for a simple two-choice shape discrimination requiring either one or both visual cortices were measured. In a total reaction time of around 400 msec. the difference found was 3.0 ± 2.6 msec. if subjects were weighted according to number of observations, and -1.34 ± 1.68 msec. if they were weighted according to reciprocals of variances; that is, the difference was not significant. The results provide no evidence that the brain is slower in shape discrimination whether one or both visual cortices received the information.

A67-81370
IDENTIFICATION OF CONSONANTS AND VOWELS PRESENTED TO LEFT AND RIGHT EARS.
Donald Shankweiler and Michael Studdert-Kennedy (Haskins Labs., New York, N. Y.).
(Acoust. Soc. of Am., 71st Meeting, Boston, Jun. 14, 1966).
Quarterly Journal of Experimental Psychology, vol. 19, Feb. 1967, p. 59–63. 17 refs.
NICHHD supported research.

The results of earlier studies by several authors suggest that speech and nonspeech auditory patterns are processed primarily in different places in the brain and perhaps by different modes. The question arises in studies of speech perception whether all phonetic elements or all features of phonetic elements are processed in the same way. The technique of dichotic presentation was used to examine this question. The present study compared identifications of dichotically presented pairs of synthetic consonant-vowel (CV) syllables and pairs of steady-state vowels. The results show a significant right ear advantage for CV syllables but not for steady-state vowels. Evidence for analysis by feature in the perception of consonants was discussed. The main findings and implications of this experiment were as follows: (1) Relatively large and stable laterality effects occur on dichotic presentation of nonsense syllables displaying phonemic contrasts. This strongly suggests that left hemisphere dominance in speech perception operates at the level of speech sound structure. (2) The effect can be demonstrated when only a single pair of syllables is presented on each trial, indicating that it pertains to the registration of the stimuli and not only to their retention. (3) The effect is significant for synthetic consonant syllables, but not for synthetic steady-state vowels. (4) The effect is greater for CV pairs differing on two articulatory features than for pairs differing on one. This suggests that the perception of such consonant syllables may involve a process of analysis by feature.

A67-81371
THE DISTANCE GRADIENT IN THE AFTER-EFFECT OF KINAESTHETIC WIDTH JUDGMENT.
A. W. Pressey (Manitoba U., Dept. of Psychol., Canada).
Quarterly Journal of Experimental Psychology, vol. 19, Feb. 1967, p. 43–48. 12 refs.

The combined effects of inspection time and interfigural distance on a kinesthetic figural after-effect were determined. The figural after-effect was defined as the degree to which a two in. width appeared to shrink following prolonged inspection of larger widths. The inspection widths were 2.0, 2.5, 3.0, 3.5, 4.0, and 4.5 in. and the inspection times were 10 and 50 sec. The results indicated that the classical non-monotonic relationship between interfigural distance and figural after-effect was not present. Instead, the figural after-effect increased as a negatively accelerated function of interfigural distance. Increasing inspection-time increased the asymptotic level of the figural after-effect. These results were interpreted in terms of the effects of strong stimuli on judgments of magnitude.

A67-81372
RESEARCH ON CONTAMINANTS CONCENTRATION OF BREATHING LIQUID OXYGEN IN AIRCRAFT CONVERTER [INDAGINE SULLA CONCENTRAZIONE DEGLI INQUINANTI DELL'OSSIGENO LIQUIDO AVIO NEI CONVERTITORI DI BORDO].
V. Iannetti and G. Pecci.
Rivista di Medicina Aeronautica e Spaziale, vol. 30, Jan.–Mar. 1967, p. 89–103. In Italian.

The concentration of contaminants in the on-board converter of the F 104 G aircraft was determined during the whole operating cycle (25 refillings) by controlling the concentration process in each intermediate phase. Oxygen analyses were carried out with gas chromotography by means of an apparatus equipped with thermistors and flame ionizing detectors. Action was suggested to specify contaminant concentrations allowable to man during flight and the dangerous effects produced.

A67-81373

HISTO-PHYSIOLOGICAL STUDY OF PULMONARY CIRCULATION OF RABBIT SUBMITTED TO ACUTE HYPERBARIC OXYGENATION AT THREE ABSOLUTE ATMOSPHERE. NOTE 2 [OSSERVAZIONI ISTO-FISIOLOGICHE SUL CIRCOLO POLMONARE DEL CONIGLIO SOTTOPOSTO AD OSSIGENAZIONE IPERBARICA ACUTA A 3 ATMOSFERE ASSOLUTE NOTA 2].

C. Vacca, F. Rosati, and L. Vacca (Naples U., Italy).

Rivista di Medicina Aeronautica e Spaziale, vol. 30, Jan.–Mar. 1967, p. 23–40. In Italian.

The pulmonary circulation of rabbits subjected to hyperbaric oxygenation was studied. Histological studies of lung, heart and blood vessels showed that hyperbaric oxygenation produced bronchial epithelium changes and frequent loss of the mucous membrane epithelium. Mild changes were reported in the alveolar epithelium. A clear vasoconstriction of the pulmonary arteries was shown at the points where they flow into arterial sinuses. Vasoconstriction in pulmonary circulation explains the infiltrations and exudation observed in parenchyma close to capillary vessels due to increased pressure and changes of capillary permeability. Voltage and morphological changes were reported, as well as ischemic repolarization changes as signs of pulmonary hypertension. The vasoconstriction reported may be partially associated with ionic changes in myocardial cells.

A67-81374

CORRELATION BETWEEN MAXIMAL AEROBIC WORK AND ANTHROPOMETRIC AND SPIROMETRIC PARAMETERS [RELAZIONE FRA IL MASSIMO LAVORO AEROBICO E I PARAMETRI ANTROPOMETRICI E SPIROMETRICI].

S. Hatzikonstantinou and D. Papanastassiou.

Rivista di Medicina Aeronautica e Spaziale, vol. 30, Jan.–Mar. 1967, p. 9–22. 18 refs. In Italain.

Maximal aerobic work was measured in seventy track athletes and oarsmen through two phases of submaximal work on a bicycle-ergometer. Maximal aerobic work corresponding to 170 beats/min. heart rate was extrapolated by calculating work performed and heart rate recorded in these two phases. Maximal aerobic work values were correlated to anthropometric data (body weight, height, sq. body surface) and spirometric data (vital capacity, maximum ventilatory capacity, apnea time, breathing air and oxygen). The ventilatory capacity coefficient was also studied, representing the sum of the theoretic values, percentages of vital capacity and maximum ventilation, divided by ten. None of these parameters were found to predict the theoretic values of maximal aerobic work. Only the body weight and ventilatory capacity coefficients had correlation coefficients different from zero, with a probability range between 0.01 and 0.05. Anthropometric and spirometric data of normal subjects were not indicative parameters for calculating theoretical values of maximal aerobic work. The importance of using parameters of circulatory function was stressed.

A67-81375

SUSTAINED PERFORMANCE, WORK-REST SCHEDULING, AND DIURNAL RHYTHMS IN MAN.

E. A. Alluisi (Louisville U., Ky.) and W. D. Chiles (Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).

(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).

Acta Psychologica, vol. 27, 1967, p. 436–442. 9 refs.

NASA Grant SC/NGR 18-002-008 and Contract DA-49-193-MD-2567.

An attempt was made to summarize a ten-yr. program of research that has dealt with sustained performance, work–rest scheduling, and diurnal rhythms in man. The general conclusions reached are: (1) man can probably follow a 4–4 work–rest schedule for very long periods without detriment to high performance; (2) for shorter periods of two or possibly four wk., selected men can follow a more demanding 4–2 work–rest schedule with resonable maintenance of performance efficiency; (3) in following the more demanding schedule, man uses up his performance reserve and so is less able to meet the demands of emergency conditions such as those imposed by sleep loss; (4) the diurnal rhythm which is evidenced in physiological measures may also be evidenced in the performance depending on the information given to, and the motivation of, the subjects, and depending also on the total work load, even where motivation is sufficiently high, the cycling may be demonstrated when the operator is overloaded; and (5) the methodology employed yielded measures that are sensitive to the manipulation of both obvious and subtle experimental variables.

A67-81376

PERFORMANCE DIFFERENCES IN CONTINUOUS TASKS.

K. F. H. Murrell (Welsh Coll. of Adv. Technol., Cardiff, Wales, UK).

(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).

Acta Psychologica, vol. 27, 1967, p. 427–435. 16 refs.

In continuous and/or repetitive work there are performance differences both between individuals and within individuals which cannot be related to any experimental variable. Tasks to which this applies may be active or inactive and it is argued that these tasks lie at two ends of a continuum, so that causes of changes in performance may be common to both. It is suggested that these causes of changes in performance may be due to changes in arousal and that these, in turn, may result from a subject becoming voluntarily auto-aroused. A mechanism for auto-arousal is proposed as also is one for the decline in arousal with time. This proposition can normally be tested only by behavioral means and an experiment is reported during which changes in the conditions are made which might be thought to change the arousal levels. These include the administration of alcohol and caffeine, isolating the subject, and administering a superimposed vigilance task on top of an active task. Preliminary examination of the results of these experiments suggests that the subjects can themselves manipulate their arousal levels, independent of the experimental variables imposed by the experimenter.

A67-81377

TRAINING FOR AUDITORY DETECTION.

J. Annett and L. Paterson (Hull U., Dept. of Psychol., Great Britain).

(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).

Acta Psychologica, vol. 27, 1967, p. 420–426. 8 refs.

Contracts Navy N62558-3143 and Navy N62558-4119.

Knowledge of results (KR) and cuing or prompting were compared as training methods for auditory skills. Use of the prompting method was based on the hypothesis that detection of difficult signals may be taught by providing clearly perceptible examples but without altering the signal or the normal noisy context. Both KR and cuing increased detections, but KR also produced an increased proportion of false positives while cuing reduced the proportion. It was suggested that in perceptual tasks KR does not operate by the reinforcement mechanism but is a relatively inefficient means of identifying instances of the signal.

A67-81378
TEMPORAL ORIENTATION AND VIGILANCE PERFORMANCE.
J. J. McGrath and James F. O'Hanlon, Jr. (Human Factors Res. Inc., Santa Barbara, Calif.).
(Inst. for Perception RVO-TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17-20, 1966).
Acta Psychologica, vol. 27, 1967, p. 410-419. 6 refs.
Contract DA-49-193-MD 2743.

A three-stage experiment was conducted to explore the feasibility of studying temporal orientation as an independent variable. The results showed that temporal orientation measured by classical techniques was not related to subsequent performance of a vigilance task. But, temporal orientation measured by subjective rates of time during the task was related to both the percentage of signals detected and the rate of performance decrement. In addition, temporal expectancy for signals was shown to vary concurrently with the detection of signals. Finally, the surreptitious altering of displayed clockrate was shown to have complex effects on the course of vigilance performance.

A67-81379
A TWO-FACTOR THEORY OF VIGILANCE IN THE LIGHT OF RECENT STUDIES.
P. D. McCormack (Carleton U., Ottawa, Canada).
(Inst. for Perception RVO-TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17-20, 1966).
Acta Psychologica, vol. 27, 1967, p. 400-409. 53 refs.
Grant NRC, Canada APA-78.

An inhibition motivation vigilance model was revised in the light of recent reaction time and signal detection findings. Performance, whether it be measured in terms of reaction time or signal detection, was related to each of two constructs, one motivational and one inhibitory in nature. Each of these was related in turn to a number of empirical experimental variables.

A67-81380
DETECTABILITY THEORY AND THE INTERPRETATION OF VIGILANCE DATA.
M. M. Taylor (Defence Res. Med. Labs., Toronto, Ontario, Canada).
(Inst. for Perception RVO TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17 20, 1966).
Acta Psychologica, vol. 27, 1967, p. 390 399. 8 refs.

The concept of subjective probability forms the basis of a brief summary of the theory of discrimination. The concept of likelihood ratio is considered as an interpretive convenience, rather than as a conceptual necessity, and is used to introduce the familiar ROC curve. Interpretation of vigilance data is discussed in terms of the expected form of the relevant ROC curves. For the detection of signals in a steady background, the typical paradigm of a vigilance experiment, the ROC curve may be severely skewed. When the data depend on a single operating point, the tabulated indices of detectability, d', and of caution, β, may give misleading impressions of actual detection. The tabulated value of β will always be higher than the true β, usually drastically so, while the tabulated value of d' will usually, but not always, be higher than the true value of d'. The tabulated values will show correlation, which may be either positive or negative, across observers in situations where the true values of d' and β would show no correlation. Though the tabulated measures may be of dubious value, the concepts of detection theory remain useful in the analysis of vigilance.

A67-81381
ACTIVATION AND LONG TERM PERFORMANCE.
H. J. Jerison (Antioch Coll., Behavior Res. Lab., Yellow Springs, Ohio.
(Inst. for Perception RVO-TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17-20, 1966).
Contract AF 33(615)-1086 and Grant AF-AFOSR-150-66.

The question of whether or not the activation theory is useful or necessary for the analysis of long term performance on perceptual tasks was discussed. After criticizing the theory for being too broad and nonspecific, because even contradictory results would not embarrass it, the report illustrated the problem with data on human and animal vigilance. It was concluded that activation theory in several forms may be necessary to understand different phases of vigilance performance. The questions relevant for activation theory include the probable inhibition of observing behavior when an overload is established by eliciting observing at a high rate, the temporal conditioning of levels of arousal, and motor aspects of the emission of detection-indicating responses.

A67-81382
STIMULUS PROPERTIES WHICH REDUCE APPARENT REVERSAL OF ROTATING RECTANGULAR SHAPES.
R. P. Power (Sydney U., Australia).
Journal of Experimental Psychology, vol. 73, Apr. 1967, p. 595-599. 14 refs.

Subjects give fewer reports of apparent reversal (AR) with rectangular shapes than other shapes. Four cues could be used by subjects as information for true rotation direction. They are: (a) the changing relationship between the vertical ends of the object; (b) the changing relationship between the horizontal edges; (c) the changing relationship between the edges parallel to the axis of rotation; and (d) the changing relationship between the edges perpendicular to the axis of rotation. An experiment was carried out in which these cues were systematically pitted against one another, and it was shown that in the case of a rectangular shape, the straight edges perpendicular to the axis of rotation constituted the cue to rotation direction and that straight edges parallel to the axis of rotation do not reduce frequency of AR.

A67-81383
STIMULUS GENERALIZATION AS A FUNCTION OF CONTEXTUAL STIMULI.
Harry Helson and Lloyd L. Avant (Kan. State U., Manhattan).
Journal of Experimental Psychology, vol. 73, Apr. 1967, p. 565-567.

Using size as the relevant variable, this experiment extends the Thomas and Jones finding of a central tendency effect in generalization from a standard to a series of hue stimuli. Five experimental groups were shown the same standard size square; the distributions of test stimuli were symmetric about the standard for one group and asymmetric about the standard for the other four. Results showed the central-tendency effect was present with an even more rigorous test than that used by Thomas and Jones, hence their results with hue were extended to size as the generalized variable.

A67-81384
OPTIMAL BEHAVIOR IN A DECISION-MAKING TASK AS A FUNCTION OF INSTRUCTIONS AND PAYOFFS.
Gordon F. Pitz and Leslie Downing (Southern Ill. U., Carbondale).
Journal of Experimental Psychology, vol. 73, Apr. 1967, p. 549-555. 11 refs.
Ill. Dept. of Mental Health supported research.

Statistical decision theory was used as a model of human decision making. One of two dice, D1, with 3 B's and 3 O's on its six faces, or D2, with 4 B's and 2 O's, was selected, and thrown five times. Subjects guessed which die had been selected, on the basis of the results of the five throws. One-hundred-twenty trials were given with an unbiased payoff matrix, followed by 60 trials with each of four biased payoff matrices. Three groups of eight subjects each were used, the groups being given differing amounts of information relevant to the decision task. With the unbiased payoffs, subjects' responses were more than 90% optimal, except when a normative model would predict confusion. Biasing the payoffs did affect responses, but not to the extent predicted by the model. Differential instructions apparently had no effect upon the optimality of behavior. Some possible amendments to a normative model of behavior were suggested to account for the observed behavior.

A67-81385
EXAMINATION FOR OPTOKINETIC NYSTAGMUS IN SLEEP AND WAKING.

R. Gardner and E. D. Weitzman (Albert Einstein Coll. of Med., New York City, N. Y.).

(Assn. for Psychophysiol. Study of Sleep, Gainesville, Fla., Mar. 25, 1966).
Archives of Neurology, vol. 16, Apr. 1967, p. 415–420. 20 refs.
Grants PHS MH-6418 and PHS NB-03356.

An optokinetic stimulus was exposed to subjects whose eyes were restrained open during sleep and during various control states. The presence or absence of an optokinetic nystagmus (OKN) response was determined. No subject responded with OKN during sleep, whereas all subjects responded during different waking conditions. Five of the ten subjects were able to diminish the OKN response voluntarily during waking, but none completely suppressed it for more than 30 consecutive sec. Awake subjects continued to respond with OKN despite an optical distortion of the stimulus greater than that which might be present during sleep. Subjects who were falling asleep demonstrated a tendency to keep their pupils beneath their eyelids at or before the onset of slow eye movements, despite the eyelid restraint. However, when the pupils were exposed to the optokinetic stimulus, OKN response did not occur in three of six subjects. Thus, the appearance and disappearance of the OKN response may be related to the sleep-waking continuum.

A67-81386
INDEPENDENT SIZE JUDGMENTS AT DIFFERENT DISTANCES.

V. R. Carlson and E. P. Tassone (Natl. Inst. of Mental Health, Bethesda, Md.).

Journal of Experimental Psychology, vol. 73, Apr. 1967, p. 491–497. 10 refs.

Three groups of 36 subjects each made size judgments under objective, apparent, or projective instructions at different distances on different days. The variable test object was located 10 ft. from the subject, the standard test object at 10, 20, 30, or 40 ft. When the means for different subjects at the 20-, 30-, and 40-ft. locations of the standard were compared, there was no statistical evidence for a trend with distance, in spite of clear trends the nonindependent means within the same subjects. In a similar experiment utilizing a much larger range of standard-to-variable distance ratios, significant trends with distance in the independent means was found. It was previously suggested that systematic deviations from size constancy arise from a tendency on the part of subjects to make their size judgments conform to an assumed perspective relationship between the test objects. This hypothesis requires a steeper slope in the size-distance function for nonindependent size judgments as compared with the independent values and is not at variance with previous results.

A67-81387
TARGET DETECTION PERFORMANCE WITH A STATIONARY RADAR SWEEP-LINE.

C. H. Baker (Human Factors Res., Inc., Santa Barbara, Calif.).

(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).
Acta Psychologica, vol. 27, 1967, p. 361–367. 9 refs.
Contract Nonr 4120(00).

Target detection performance of 24 subjects was determined with three radar displays: (1) a conventional plan position indicator (PPI); (2) a PPI which visually denied display regions where targets were improbable; and (3) a PPI which rotated and consequently displayed a stationary sweep-line. Detection performance with each of the latter two displays was superior to that with the conventional display. The superiority was most marked with the stationary sweep-line; using this display subjects detected some 50% more targets than they did when using the conventional display.

A67-81388
ON THE DISTRIBUTION OF ATTENTION IN A DYNAMIC ENVIRONMENT.

J. W. Senders (Bolt, Beranek and Newman, Inc., Cambridge, Mass.).

(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).
Acta Psychologica, vol. 27, 1967, p. 349–354. 8 refs.

A rational model was described about visual sampling behavior in inspecting a large number of visual displays, where significant deviations were to be detected. The interval between two successive observations of the same display is supposed to be dependent on the value of the time function at the first observation. A next observation can be deferred until the probability that the function will exceed the limits of safe operation exceeds some probability threshold. Transition probabilities from one to another display were found to be dependent on actual probabilities of fixation (random model), when the values of the signals were unrelated. In the case of correlated displays, a certain constraint is to be expected. Assuming that the operator is a single-channel device, attentional demand of several displays levels to queueing; the length of the queue is a function of the probability of simultaneous demand.

A67-81389
EVIDENCE OF INTERNAL CLOCKS IN THE HUMAN OPERATOR.

P. L. Latour (Inst. for Perception RVO–TNO, Soesterberg, The Netherlands).

(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).
Acta Psychologica, vol. 27, 1967, p. 341–348. 9 refs.

Several experiments, focused on the disclosure of periodicities in reaction time and psychophysical or physiological reactions of human subjects were described. It was found that a clear alpha activity in the electroencephalogram was a necessity for the occurrence of periodicities in the reaction time of the eye to horizontal changes in position of a fixation light. During the experiments the alpha activity was partly suppressed and a more rapid rhythm, which was harmonically related

both to the alpha rhythm and the periodicities in the reaction times, occurred. The time intervals between the successive rapid saccadic movements of the optokinetic nystagmus revealed even more distinct periodicities which were also linked to the other periodicities of the same subject. In another experiment in which the visual threshold was measured as a function of time using double flashes, it was found that the threshold was an almost periodic function of time with a period of about 30 msec.

A67-81390
EYE MOVEMENTS, EVOKED RESPONSES AND VISUAL PERCEPTION: SOME SPECULATIONS.
C. T. White (U.S. Navy Electron. Lab., San Diego, Calif.).
(Inst. for Perception RVO-TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17-20, 1966).
Acta Psychologica, vol. 27, 1967, p. 337-340. 10 refs.

In a number of studies dealing with the activity of the visual system it has been found that the duration of 250-300 msec. appears to be critical in some manner. It is suggested that these findings (from studies dealing with fixation durations during visual search, evoked cortical potential patterns, and the temporal limitations in the visual perception of sequential events) may be related to certain aspects of the processing and assimilation of visual information.

A67-81391
WORK ANALYSIS OF RADIO-BRIDGE MAINTENANCE STAFF IN OCCUPATIONAL PREVENTIVE MEDICINE [UN TIPO DI ANALISI DI LAVORO PER IL PERSONALE DELLA MANUTENZIONE DEI PONTI-RADIO NEL QUADRO DELLA MEDICINA PREVENTIVA DEL LAVORO].
M. Strollo.
Rivista di Medicina Aeronautica e Spaziale, vol. 30, Jan.-Mar. 1967, p. 41-53. In Italian.

A model of work analysis for a radio-bridge maintenance staff was illustrated. A short survey of the characteristics of the particular work was given, as that is an essential stage in preparing personnel selection procedures. Those subjects who best meet the requirements and are capable of better proficiency and easier adaptation to the work considered are preferred. The model was directed to meet two aims; selection and accident prevention. A flexible system was used which considered anatomical, psycho-physiological and psychological characteristics together and which joined traditional methods with methods presently proposed as dynamic and motivational functions of task proficiency and adaptation. It was suggested that, with appropriate changes, the model could be used in other work categories.

A67-81392
DANGERS OF SELF-MEDICATION IN PILOTS. DRUGS THAT CAN COUNTER-INDICATE FLYING ACTIVITY AND WHICH ADMINISTRATION WITHOUT MEDICAL ADVICE IS MOST FREQUENT [I PERICOLI DELL'AUTOTERAPIA NEL PILOTA. FARMACI CHE POSSONO CONTROINDICARE L'ATTIVATA' DI VOLO E DI CUI E' PIU' FREQUENTE L'ASSUNZIONE SENZA CONSIGLIO MEDICO].
G. Valletta (Rome U., Scuola di Specializzazione in Med. Aeron. e Spaziale, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 30, Jan.-Mar. 1967, p. 54-88. 31 refs. In Italian.

Characteristics of the standard psycho-physiological profile of flying personnel in connection with self-administration of drugs was surveyed. Possible causes of self-medication of drugs without medical advice and control were reported. All pathologic symptoms were divided according to their connection with self-medication, and a survey was made of aviation occupational pathology which might promote self-medication. Drugs frequently used in self-medication were divided according to their pharmacological action, and their dangerous effects on flier performance were studied. Some cases of dangerous self-medication of flying personnel were reported. Necessity for control in this field by doctors with a knowledge of aviation medicine was indicated.

A67-81393
CLOTHING HYGIENE WITH PARTICULAR REFERENCE TO AEROSPATIAL PROBLEMS. III [L'IGIENE DEL VESTIARIO CON PARTICOLARE RIFERIMENTO AI PROBLEMI AEROSPAZIALI (PARTE TERZA)].
E. Sulli (Rome U., Ist. di Igiene and Ispettorato di Sanita' Aeron., Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 30, Jan.-Mar. 1967, p. 105-161. 49 refs. In Italian.

The hygienic study of protective garments is important for the protection of the individual from noxious agents in work environments. Characteristics of the more important protective garments were examined, and particular emphasis was placed on some of the better known fire-proofing methods. Also considered were the possibilities of various skin diseases connected with the use of particular garments and their action of individual health. Disinfection and disinfestation of garments and fabrics were also studied, as well as the effective control of methods used.

A67-81394
RESPONSE LATENCY IN A PATTERN PERCEPTION SITUATION.
R. M. Pickett (Harvard U., Cambridge, Mass.).
(Inst. for Perception RVO-TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17-20, 1966).
Acta Psychologica, vol. 27, 1967, p. 160-169. 11 refs.
NASA Contract NsG-718-22-07-020, Contracts AF 33(615)-1815 and AF 33(615)-1086)

The hypothesis that response latency is directly related to size of sample in a statistical discrimination process was tested in a visual pattern perception situation. Subjects were required to categorize each of a sequence of patches as COARSE or EVEN in texture relative to a designated criterion. Speed and accuracy of performance were determined for patches at various degrees of variation in texture on either side of the criterion. Effects of texture variations on combined response latency and response probability were consistent with a sequential sampling model of the discrimination process. Effects on conditional response latency were not.

A67-81395
INDIVIDUAL AND TWO-MAN TEAM TARGET FINDING PERFORMANCE.
John P. Hornseth (Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio) and James H. Davis (Miami U., Oxford, Ohio).
Human Factors, vol. 9, Feb. 1967, p. 39-43.
Contract AF 33(615)-2032.

Individuals and two-man teams were tested on three target finding tasks. Effective performance of a target-finding task requires the establishment of an efficient search strategy which minimizes the time taken to find the target. On two of the tasks team performance was not better than would be expected, from normal order statistics, of its more capable member. Team performance on the third task presented

evidence of a shift in team search strategy away from independent (or redundant) searching toward a more effective division of labor.

A67-81396
AN INFORMATION-PROCESSING MODEL OF THE AIRCRAFT ACCIDENT INVESTIGATOR.
Myron L. Braunstein and Orel F. Coleman (Calif. U., Dept. of Psychol., Irvine).
Human Factors, vol. 9, Feb. 1967, p. 61–70.
Grants PHS AC 00209 and PHS AC 00288.

Verbal reports elicited from accident investigators and motion pictures of the investigators' activities during 16 investigations of light aircraft accidents were used as the empirical basis for a computer model of the aircraft accident investigator. The model simulates the major processes apparent in the investigators' reports, including the selection of aircraft and terrain features to be observed and the generating and testing of kinematics hypotheses. The computer program accepts a description of aircraft damage and gouge marks and generates a series of kinematics hypotheses. The effects of variations in investigator parameters on the outputs of the model were studied in a series of 40 simulation runs. A preliminary comparison was made between the output of the model and the conclusions of a human investigator working with the same data.

A67-81397
APPARENT INDIVIDUAL DIFFERENCES IN CHANNEL CAPACITY.
A. Elithorn and T. J. Barnett (Inst. of Neurol. and Roy. Free Hosp., London, Great Britain).
(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).
Acta Psychologica, vol. 27, 1967, p. 75–83. 8 refs.

Two experiments are described which suggest that human subjects can respond independently to stimuli presented in opposite half fields. Individual differences in the ability to achieve such independent responses are related to personality variables and it is suggested that subjects who are able to process two stimuli achieve this by inhibiting the interhemisphere transfer of some part of the central organizing processes involved.

A67-81398
ATTENTION AND PSYCHOPHYSICAL TIME.
A. B. Kristofferson (McMaster U., Hamilton, Ontario, Canada).
(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).
Acta Psychologica, vol. 27, 1967, p. 93–100.
NASA Grant NGR-52-059-001 and Grant NRC, Canada APB-112.

A theory of central intermittency is proposed in which a central temporal process is assumed to control both the switching of attention between input channels and the transfer of information between central stages. Three very different behavioral measurements are integrated by these assumptions and lead to the conclusion that the temporal process can be thought of as a succession of equally-spaced points in time occurring at a rate of approximately twenty points per second.

A67-81399
EXPECTANCY, WAITING TIME AND THE PSYCHOLOGICAL REFRACTORY PERIOD.
R. S. Nickerson (Decision Sci. Lab., Bedford, Mass.).
(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).
Acta Psychologica, vol. 27, 1967, p. 23–34. 6 refs.

The problem of the expectancy for the second of two variably spaced signals growing with the waiting time following the occurrence of the first signal was considered. An experimental procedure which makes waiting time non-informative was described. Data from two experiments were presented which suggest that the procedure may have been effective in stabilizing psychological expectancy over waiting time. Nevertheless, reaction time (RT) to the second of two signals varied inversely with the duration of the interval between signals, for intervals up to approximately 250 msec. Minimal RT were not consistently associated with the most frequent, median or mean interval durations. Independently of interval duration, RT tended to vary inversely with the 'momentary' probability of signal occurrence.

A67-81400
INFORMATION MANAGEMENT FOR A BIOMEDICAL RESEARCH LABORATORY IN SPACE.
Donald B. Nelson (TRW Systems, Redondo Beach, Calif.).
(IX Intern. Congr. on Diseases of the Chest, Copenhagen, Denmark, Aug. 20–25, 1966).
Diseases of the Chest, vol. 51, Apr. 1967, p. 392–394.

Information management for a biomedical research laboratory in space denotes a complex of interrelated information functions encompasing the space laboratory, its ground control center and the intercommunication telemetry system. The effective use of computers and more comprehensive biomedical systems requires an interdisciplinary approach to the total system design and an integrated development of the computer specification. Computers can be used in biomedical systems to supplement and extend human capabilities by mechanization provided the computer management of information has been precisely defined. There are two different information management systems at present which are particularly relevant to the comprehensive information needs of a biomedical laboratory and its ground control center: (1) GIM-1, a general language and computer system; and (2) the in-flight medical control system developed for the Mercury and Gemini space programs to monitor and control the physiologic well-being of the astronauts. Present biomedical systems include examples which are particularly relevant to the intercommunication telemetry system, to the flight control consoles and other input and output devices and to the post-flight study programs. The information management for a biomedical research laboratory in space is totally within the present "state of the art" in biomedical systems.

A67-81401
SYSTEMS ENGINEERING IN AEROSPACE MEDICAL RESEARCH.
Richard D. DeLauer (TRW Systems, Systems Eng. and Integration Div., Redondo Beach, Calif.).
(IX Intern. Congr. on Diseases of the Chest, Copenhagen, Denmark, Aug. 20–25, 1966).
Diseases of the Chest, vol. 51, Apr. 1967, p. 395–401.

A brief discussion of the methodology and tools of systems engineering was presented in order to bring to the attention of the medical profession the desirability of looking at their problems from a systems point of view. By utilizing the resources and capabilities of the engineering profession, the physician will be permitted greater availability for the care of his patients and his care will be more efficiently and effectively applied. If the physician is able to develop the systems

engineer's ability to look outward to all parts of a system, rather than inward at only one particular subsystem, he will be better able to define his technical needs and requirements for the systems engineer, and the systems engineer will be better able to assist in the solution of his problems.

A67-81402
AROUSAL LEVELS AND THOUGHT PROCESSES DURING SENSORY DEPRIVATION.
A. Michael Rossi, Allan Furhman, and Philip Solomon (Harvard Med. School, Boston, Mass.).
Journal of Abnormal Psychology, vol. 72, Apr. 1967, p. 166–173. 22 refs.
Contracts ONR 1866(29) and ONR NR 152-115.

Bioelectric recordings and verbal reports of mental activities were collected from ten subjects during six hr. of sensory deprivation (SD). Subjects and three experts independently rated the reports for (a) type of thought process, and (b) level of thought organization: subjects also rated (c) their level of arousal during the period covered by report. Results indicate that subjects are not highly accurate raters for the three categories mentioned, and the majority of thought disorganizations and non-reality-oriented thought processes occur during low levels of arousal. The conclusion reached is that SD does not disrupt the normal relationship between levels of arousal and thought processes, but in the absence of usual environmental cues subjects may misinterpret their mental experiences.

A67-81403
RECOGNITION OF LUNAR CRATERS.
James Wilde, Jerome Siegel, and James Williams (Kollsman Instr. Corp., Syosset, N. Y.).
Human Factors, vol. 9, Feb. 1967, p. 33–38. 7 refs.

Recognition thresholds for lunar crater size were determined, analytically, for various look angles and magnifications, at an orbital altitude of 80 nautical miles. Elliptical image measurements for various sized craters were combined with some previous threshold recognition data for the ellipse. Elliptical image measurements consisted of the visual angle of the major axis, and elliptical form (the ratio of minor axis to major axis). A computer program was generated from which the visual angle and form measurements of anticipated elliptical crater images were computed for various combinations of crater size, look angle, and magnification. Previous data were then re-worked to obtain the visual angle and form measurements associated with the recognition threshold data for the ellipse. By graphically combining the visual angle and from data from both computations, 50% and 75% threshold recognition curves were generated, relating crater size, magnification and look angle. Implications of these data are discussed.

A67-81404
IMAGE QUALITY AND TARGET RECOGNITION.
Corwin A. Bennett, Samuel H. Winterstein, and Robert E. Kent (IBM, Electron. Systems Center, Owego, N. Y.).
Human Factors, vol. 9, Feb. 1967, p. 5–32. 61 refs.

The terminology and literature in the area of image quality and target recognition are reviewed. An experiment in which subjects recognized strategic and tactical targets in aerial photographs with controlled image degradations is described. Recognition performance is only moderate for representative conditions. There are wide differences among target types in the recognizability. Knowledge of a target's presence (briefing) greatly aids recognition. Better resolution means better performance. Enlarging the image such that a line of resolution subtends more than three minutes of arc hinders recognition. Grain size should be kept below 20 sec. of arc. It is suggested that the eventual application of the modulation transfer function approach to measurement of image quality and target characteristics will enable a quantitative subsuming of various quality-size relationships. More attention needs to be paid in recognition research to suitable task definition, target description, and subjects selection.

A67-81405
GROUPING STRATEGIES IN DICHOTIC LISTENING: THE EFFECTS OF INSTRUCTIONS, RATE, AND EAR ASYMMETRY.
Wayne H. Bartz, Paul Satz, and Eileen Fennell (Fla. U., Gainesville).
Journal of Experimental Psychology, vol. 74, May 1967, p. 132–136. 9 refs.

Grouping strategies and ear asymmetry (EA) were investigated in the Yntema and Trask dichotic listening (DL) paradigm. Trials consisting of three word-digit pairs were recorded at two rates, 2 pr. and 1 pr./sec. Eight groups of 20 right-handed subjects differed in terms of rate and instructions for recall: Pairs, Types, Ears, and Free. Results showed that Types and Ears strategies did not differ at either rate, the Ear strategy was most frequent under free recall, and EA effects were significant. Results indicate significant EA effects in DL experiments and should be a factor in models of DL.

A67-81406
PRIMARY STIMULUS GENERALIZATION OF THE GSR AS A FUNCTION OF OBJECTIVE AND SUBJECTIVE DEFINITION OF THE STIMULUS DIMENSION.
Kenneth R. Burstein, Seymour Epstein, and Barry Smith (Mass. U., Amherst).
Journal of Experimental Psychology, vol. 74, May 1967, p. 124–131. 17 refs.
Grant NIMH MH 01293.

Two experiments were conducted to determine whether the divergent results obtained in previous replications of Hovland's classic study of generalization to auditory frequency could be accounted for on the basis of subjects responding to a subjectively defined dimension rather than to the objective one defined by the experimenter. In two experiments subjects were asked to identify the test stimuli (tones of 153, 468, 1,000, and 1,967 c.p.s.). No support was obtained in either of the experiments for decremental gradients of stimulus generalization when response strength was plotted as a function of the perceived or physical characteristics of the stimuli. Accuracy of labeling the generalization stimuli as the conditioned stimulus produced highly reliable negatively accelerated decremental gradients.

A67-81407
SERIAL ORDER IN RECOGNITION AND RECALL.
M. C. Corballis (McGill U., Montreal, Canada).
Journal of Experimental Psychology, vol. 74, May 1967, p. 99–105. 16 refs.
Contract Nonr-4896(00) and Grant DRB, Canada 9425-10.

Two experiments are reported in which subjects viewed 100 series of five digits, each followed by a sixth "critical" digit. They were required to indicate as quickly as possible by pressing one of two buttons whether or not the critical digit had appeared in the series. In Exp. I (20 subjects) presentation rate was varied. In Exp. (10 subjects) there were three recall trials as well as the 100 recognition trials, but the subject did not know whether he was to recall the five digits or

make a recognition response until after the digits had been presented. In both experiments recognition times showed a strong recency effect, i.e., faster recognition response until after the digits had been presented. In both experiments recognition times showed a strong recency effect, i.e., faster recognition times the later the critical occurred in the series, while in the recall trials in Exp. II subjects generally reported the digits in the forward order. These results are interpreted to mean that the forward ordering in recall is a feature of the recall process itself rather than of storage, and that in recognition the subject has direct access to relevant elements of a serial trace without first having to scan irrelevant ones.

A67-81408
EQUIDISTANCE JUDGMENTS IN THE VICINITY OF A BINOCULAR ILLUSION.
Frank L. Agee, Jr. (Boeing Co., Seattle, Wash.) and Walter C. Gogel (Calif. U., Santa Barbara).
Journal of Experimental Psychology, vol. 74, May 1967, p. 87–92. 11 refs.

Misleading size cues associated with a binocularly observed trapezoidal window produced an apparent depth orientation of the window which was different from its physical orientation. As expected, it was found that errors occurred in adjusting two other objects (discs) to apparent equidistance with each other in the presence of the window, and that the direction of the errors in apparent equidistance was related to the direction of the errors in the perceived slant of the trapezoidal window. It was less clear that errors in the judgment of apparent equidistance occurred when the orientation of the window and the separation of the discs were vertical rather than horizontal. Possible explanations for discrepancies between the magnitude of the perceptual errors associated with the equidistance judgments were discussed.

A67-81409
STIMULUS SELECTION AT DIFFERENT STAGES OF PAIRED-ASSOCIATE LEARNING.
Carlton T. James and James G. Grenno (Ind. U., Bloomington).
Journal of Experimental Psychology, vol. 74, May 1967, p. 75–83. 11 refs.
Grant NSF GB 2791.

Subjects learned paired associates with compound stimuli (word + nonsense). Transfer was tested to individual components after varying amounts of training on the compounds. Subjects who were trained to a single perfect trial showed no more transfer to nonsense components than subjects trained to four of eight correct responses to the compounds; however, subjects receiving ten overtraining trials on compounds showed substantially more transfer to the nonsense components. Then a group of subjects was given training after learning a list of compound stimuli to criterion, but during the extended training other items were added so that the list was not mastered while the initial items were receiving overtraining. This group showed no more transfer to nonsense components than a group trained just to criterion. The data are generally consistent with the hypothesis that subjects actively select among stimulus aspects until the list is mastered, and then relax the selection of attention during overtraining.

A67-81410
SERIAL LEARNING AND ORDER INFORMATION.
Norman J. Slamecka (Vt. U., Burlington).
Journal of Experimental Psychology, vol. 74, May 1967, p. 62–66. 15 refs.
Grant NSF GB-2590.

Serial learning was studied with varied sources of item-order information. Group 1 had temporal input order identical to prescribed output order. Group 2 had temporal input unrelated to prescribed output order, by presentation of items in spatial array independent of their temporal succession. Spatial location was the only source of order information. Group 3 also had temporal input unrelated to prescribed output, and also lacked consistent absolute position information. Relative spatial location was the only source of order information. Results showed that Group 3 was slower than Groups 1 and 2, which did not differ. Serial-position curves were sensitive to the required output order, and not to the input order. The data strongly supported a position-learning interpretation of serial learning.

A67-81411
EVALUATION OF A RESPONSE SPEED MEASURE OF INCENTIVE VALUE OF REWARD.
Charles Y. Nakamura and Bruce R. Krudis (Calif. U., Los Angeles).
Journal of Experimental Psychology, vol. 74, May 1967, p. 44–49. 10 refs.
Grant NICHHD HD-00908.

Response speeds can be obtained under experimental procedures in which the subject is altered or in which he is not aware that speed scores are being recorded. The two types of scores may give different information. The present experiment was designed to provide evidence for the reliability and utility of a measure of the second type as an indicator of altitude toward, or incentive value of, reinforcers. The results were consistent with predictions based on previous findings. The response-speed curve over trials for a high reward group leveled off after an initially rapid rise while that for the low reward group took the form of a shallow inverted U. Consequently, the high reward group gave the faster terminal response speeds. It was concluded that this type of measure has potential for investigating motivational variables in performance.

A67-81412
EFFECT OF DURATION OF VIEWING ON FORM AND SIZE JUDGMENTS.
Rudy Nesmith and Albert S. Rodwan (Emory U., Atlanta, Ga.). *(SEPA, Meeting, New Orleans, Mar. 1966).*
Journal of Experimental Psychology, vol. 74, May 1967, p. 26–30. 12 refs.
Grant NIH MH 11210.

Two microgenetic hypotheses were tested: perception would become more stable with an increase in duration of viewing; and this increase is different for form and for size. One-hundred plane figures, all combinations of ten heights and ten widths varying in increments of .01 in. constituted the stimulus set. They were presented singly as back-lighted figures in a completely dark surround. Seven male subjects had at least 20–20 vision uncorrected or with contact lens. There were nine durations of viewing and two types of judgments: form, squares and rectangles, or size, large and small. Discrimination measures were computed and showed that subjects could discriminate form better than they could discriminate size. There was not significant effect of duration on either type of discrimination, nor was there any interaction between type of judgment and duration.

A67-81413
USE OF THE ORBITAL SPACE LABORATORY FOR RESEARCH IN BIOLOGY AND MEDICINE.

O. K. Niess and Blair W. Sparks.
(IX Intern. Congr. on Diseases of the Chest, Copenhagen, Denmark, Aug. 20–25, 1966).
Diseases of the Chest, vol. 51, Apr. 1967, p. 384–391.

A discussion was presented of the experiments and studies to be conducted in the unique environment of the manned orbital space laboratory. These laboratories will engage in biomedical research during flight, and it will be important to recognize extraordinary biologic chemical events as they occur in living systems against time in the orbiting laboratory. The role and importance of the space surgeon, and some of his problems, were also discussed. It is expected that these laboratories will make major contributions to the present knowledge of chest disease and will provide useful tools for diagnosis, clinical practice and disease prevention.

A67-81414
CONFIGURATIONAL LETTER SPANS.
Herbert F. Crovitz (Veterans Admin. Hosp., Durham, N. C.) and Larry A. Friedman (Duke U., Durham, N. C.).
Journal of Experimental Psychology, vol. 73, Apr. 1967, p. 628–629.

Seventeen subjects viewed for 100 msec. a string of eight letters arranged in three closed curves: a circle, a vertical ellipse, and a horizontal ellipse. The ellipses were twice as long on their major than their minor axis, and the circumference of all curves was the same. Letters were equally spaced with respect to distance on the curves. They were equally spaced with respect to distance on the curves. There was no significant effect attributable to the difference between the curves. Both the order of report and the accuracy of report were controlled by the relative position of letters, as had been previously found to be the case for strings of letters arranged in a straight line.

A67-81415
EFFECTS OF CONTEXT ON REACTION TIME TO OPTIMALLY CODED SIGNALS.
B. Forrin (Toronto U., Scarborough Coll., Canada) and R. E. Morin (Kent State U., Ohio).
(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).
Acta Psychologica, vol. 27, 1967, p. 188–196. 13 refs.
Grant NSF GB-4343.

It has frequently been observed that the time required to name a given numeral is relatively unaffected by the number of additional numerals in the stimulus set. In contrast, the results of the present study demonstrated that the latencies of numeral-naming reactions were significantly increased by the presence, in serial context, of geometric symbols coded arbitrarily. To account for the rise in reaction time to numerals, a two-stage identification process was tentatively proposed: subject first recognizes the class of the stimulus displayed (numeral or symbol) and, subsequently, identifies the specific element within that class. Predictions derived from this conjecture received only partial support from the data.

A67-81416
CHOICE REACTION TIME FOR REPETITIONS AND NON-REPETITIONS. A RE-EXAMINATION OF THE INFORMATION HYPOTHESIS.
S. Kornblum (Mich. U., Mental Health Res. Inst., Ann Arbor).
(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).
Acta Psychologica, vol. 27, 1967, p. 178–187. 6 refs.
Grant NIH MH-07197.

The principal objective of this study was to describe some of the characteristics of the responses to repetitions and alternations in choice reaction time (RT) tasks. To the extent that these responses were shown to be differentially sensitive components of the overall RT, whose weighted sum yielded the linear relationship between the mean overall RT and transmitted information, it was suggested that a more detailed study of these components may be the more fruitful approach toward understanding the microstructure of RT processes. Clearly these arguments are not restricted to RT tasks alone but are applicable to a wide variety of experimental results which have been described in terms of a linear relationship between information and performance measures. Our results in no way deny the descriptive statements of the information hypothesis. On the contrary, our data in fact provide one more confirmation of the hypothesis. However, we have pointed toward a possible artifactual reason for the relationship and a change of emphasis has been suggested which may lead to more explanatory types of statements than have been forthcoming from the information approach.

A67-81417
DECISION MAKING DURING PACED ARRIVAL OF PROBABILISTIC INFORMATION.
A. F. Sanders and W. Ter Linden (Inst. for Perception RVO–TNO, Soesterberg, The Netherlands).
(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).
Acta Psychologica, vol. 27, 1967, p. 170–177. 7 refs.

Four exploratory experiments are described in which the basic assumptions of the Edwards–Wald model for decision making in probabilistic sequential tasks were tested. The assumptions were: (1) continuous revision of the likelihood ratio on the basis of incoming data; and (2) a fixed decision criterion on the basis of costs and pay-offs. The results suggested that the decision criterion shifts from rather strict to quite risky as clear evidence is postponed, so that the criterion is certainly not fixed. The findings were not contrary to the idea of revision of the likelihood ratio.

A67-81418
DECISION TIMES IN SIGNAL DETECTION.
G. L. Wolfendale (Nottingham U., Great Britain).
(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).
Acta Psychologica, vol. 27, 1967, p. 154–159. 6 refs.

There is some evidence that the human detector can integrate information from observation intervals. This problem was studied for continuous observation. It was found that there was integration over time but that the integrating 'strategy' adopted by the subject was probably mixed involving trial by trial changes in parameters. Further experimentation demonstrated that expectation by the subject produced contingent effects on the probabilities of detection and decision latencies.

A67-81419
REACTION TIME AND ACCURACY.
J. F. Schouten and J. A. M. Bekker (Inst. for Perception Res., Eindhoven, The Netherlands).
(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).
Acta Psychologica, vol. 27, 1967, p. 143–153.

The fraction of errors in a binary reaction experiment is found to depend upon reaction time. This effect, already apparent in a free reaction time experiment, is corroborated by using the method of forced reaction time. In this method the

subject is instructed to react in coincidence with an additional command signal. The binary stimulus then serves as an information signal only. The dependence of the fraction of errors upon reaction time seems to rule out any theory based upon the assumption that the subject reacts if and when he has obtained a fixed certainty regarding the quality of the stimulus.

A67-81420
TIME TO DETECT ERRORS AS A FUNCTION OF FACTORS AFFECTING CHOICE-RESPONSE TIME.
P. Rabbitt (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).
(Inst. for Perception RVO-TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17-20, 1966).
Acta Psychologica, vol. 27, 1967, p. 131-142. 11 refs.

The time taken to detect errors committed in serial, self-paced choice-response tasks was measured at two levels of practice and under six experimental conditions known to affect choice-response time (RT). Early in practice conditions affecting correct RT also affected error detection RT. After practice error detection RT was constant between tasks in which mean correct RT varied significantly. The data permit some choice among a series of models for the process of error detection.

A67-81421
IDENTIFICATION OF SIMULTANEOUSLY PRESENTED SIMPLE VISUAL AND AUDITORY STIMULI.
E. Tulving and P. H. Lindsay (Toronto U., Dept. of Psychol., Canada).
(Inst. for Perception RVO-TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17-20, 1966).
Acta Psychologica, vol. 27, 1967, p. 101-109. 15 refs.
Grant NRC, Canada APT 39.

Two experiments were reported which involved absolute judgments of simple visual and auditory stimuli of very short (20 .msec. and 50 msec.) and longer (2 sec.) duration, under the conditions of simultaneous presentation of stimuli from both modalities. The experiments were designed to explore certain implications of the hypothesis that simultaneously presented stimuli are attended sequentially. Although simultaneously presented stimuli were not identified as efficiently as the same stimuli presented singly, no evidence for the sequential processing hypothesis was found.

A67-81422
WHERE IS CAPACITY LIMITED? A SURVEY AND A MODEL.
N. Moray (Sheffield U., Dept. of Psychol., Great Britain).
(Inst. for Perception RVO-TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17-20, 1966).
Acta Psychologica, vol. 27, 1967, p. 84-92. 33 refs.

A model is presented for the limitations of processing information by the human operator which proposes that he acts not as a limited capacity channel with fixed capacity, but as a limited capacity processor. The total capacity of the brain can be allocated to the separate aspects of the tasks, such as reception, recoding, emission, storing, etc. Hence from moment to moment the size of the 'channel' in the Shannon sense will appear to vary. In particular parallel processing is possible where the total capacity is not exceeded, and where there is high compatibility. Experimental evidence in support of the model is presented.

A67-81423
SOME EXPERIMENTS ON REFRACTORINESS.
W. G. Koster and J. A. M. Bekker (Inst. for Perception Res., Eindhoven, The Netherlands).
(Inst. for Perception RVO-TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17-20, 1966).
Acta Psychologica, vol. 27, 1967, p. 64-70. 11 refs.

When two stimuli are presented in rapid succession and a subject has either to react to both or to the second stimulus only, the second reaction time increases with decreasing interstimulus interval. Several theories have been put forward to explain this phenomenon. Experiments are described with which the expectancy theory and the intermittency theory can be tested. From the experimental data it is argued that the effect of expectancy is to be neglected with interstimulus intervals shorter than .6 of a second. There appeared to be a clear discrepancy between the predicted data based on an intermittency hypothesis and the experimental data.

A67-81424
INTERMITTENCY AND SELECTIVE ATTENTION.
R. Davis (Reading U., Dept. of Psychol., Great Britain).
(Inst. for Perception RVO-TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17-20, 1966).
Acta Psychologica, vol. 27, 1967, p. 57-63. 8 refs.

Selective attention was investigated using a reaction time technique by presenting the subject with two signals separated by a variable time interval. One of the signals, the "data" signal could take one of two values along each of two dimensions, color and number. The other signal, the 'cue' signal indicated which of these dimensions was relevant for the subjects response. Two different conditions were examined. In the first the cue signal preceded the data signal by a variable interval; in the second the cue signal followed the data signal at a variable interval. By recording reaction times for a correct classification on a set of keys, it was shown that results for the first condition were consistent with sequential processing of the cue signal followed by the data signal. In the second condition a further source of intermittency appeared and this seemed to be due to the central systems becoming blocked by irrelevant information from the data signal.

A67-81425
THE REFRACTORY PERIOD OF CHOICE REACTIONS WITH REGULAR AND IRREGULAR INTERSTIMULI INTERVALS.
P. Bertelson (Free U., Brussels, Belgium).
(Inst. for Perception RVO-TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17-20, 1966).
Acta Psychologica, vol. 27, 1967, p. 45-56. 16 refs.

On each trial, two successive choice reactions, each a two-choice one, had to be given to visual stimuli. The stimuli were separated by time intervals (ISI) ranging from 0 to 500 msec. which were presented in both a predictable (regular condition) and an unpredictable way (irregular condition). Efforts were made, through instructions and the provision of knowledge of results, to have the subjects give priority to speed in the first reaction. Six subjects gave more than 2,000 trials each, in ten successive sessions. No tendency to wait for the second stimulus was observed. Clear delays, negatively correlated with ISI duration, were observed in the second reaction at short ISI, with both predictable and unpredictable ISI. Time uncertainty is thus not a necessary condition for the production of such delays. The relationship between RT_2 and the interval between the arrival of the second signal and the end of RT_1 suggest: (a) that the central mechanisms are occupied by the first reaction for a time which lasts longer than RT_1, which is in agreement with Davis' suggestion of a

central recovery time; (b) that this central recovery time is variable; (c) that the occupation by the first reaction is not total, and that some residual capacity is still available during the refractory period to deal with the second signal.

A67-81426
COMPUTER DETERMINATIONS OF THE EFFECT OF SUPERSEDING SIGNALS.
R. Gottsdanker (Calif. U., Dept. of Psychol., Santa Barbara). *(Inst. for Perception RVO–TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).*
Acta Psychologica, vol. 27, 1967, p. 35–44. 13 refs.
Grant NIMH MH 10447-02.

The question under consideration is whether psychological refractoriness holds for graded responses made with a single anatomical unit. To answer this question, four adult human subjects were given the task of sliding a pointer to whichever of two lamps was illuminated, the lamps being at different distances from the starting point. Occasionally the lamp remained on for only 40 or 50 msec., simultaneously with the illumination of the other lamp, which was the signal either to curtail or to extend the initial command. Computer analysis is being undertaken to find the interval between the appearance of the second signal and its initial effect, under some circumstances definable as RT_2. Procedures have been devised or are being devised to provide meaningful ways of combining data from the time curves of responses on different trials.

A67-81427
HUMAN SPATIAL ORIENTATION.
I. P. Howard and W. B. Templeton (Durham U., Great Britain). London, John Wiley and Sons, 1966. 533 p. Many refs.

Those aspects of human behavior were presented which are determined by the angular position of the body (or head) in relation to any stable reference system. An analysis of the way in which behavior is molded or conditioned by physiological and physical constraints was included. General content included chapters on the retina and visual direction, eye movements and visual direction, kinesthesis, the vestibular apparatus, auditory localization, orientation to gravity (including inclination, body tilt, tilt adaptation, figural after-effects, postural reflexes, and judgment of postural vertical), egocentric orientation, orientation and shape (including judgment of shape orientation, shape discrimination, and the effect of shape orientation of children's drawings), sensorimotor and intersensory localization, the behavioral consequences of rotations and displacements of optical array, and orientation in the weightless state. Being a comprehensive review a bibliography of about 1500 references is given.

A67-81428
BIBLIOGRAPHY ON MUSCLE RECEPTORS: THEIR MORPHOLOGY, PATHOLOGY AND PHYSIOLOGY.
Earl Eldred, Herbert Yellin, Linda Gadbois, and Susan Sweeney (Calif. U., School of Med. Dept. of Anat. and Brain Res. Inst., Los Angeles).
Experimental Neurology, Supplement 3, Jun. 1967, p. 1–154. Many refs.
Grants PHS NB-01143 and PHS NB-03019.

A selective bibliography is compiled on various aspects of sensory receptors of muscle. Articles of retrospective nature date to the pre-1860 period. A total of 1,470 references are cited. Areas of interest include morphology of receptors, receptor axons, physiology and pharmacology or receptors and receptor pathology. A subject index is provided.

A67-81429
BEHAVIORAL COMPENSATION WITH MONOCULAR VISION.
R. H. Day (Monash U., Dept. of Psychol., Melbourne, Australia), D. Singer, and K. Keen (Sydney U., Dept. of Psychol., Australia).
Science, vol. 156, May 26, 1967, p. 1129–1130.

Compensatory changes which occur with monocular parallax were measured using a viewing arrangement in which the subject was required to respond frequently by marking a point on the surface so that it appeared in line with the center of the aperture. Changes were expected to occur because of the new visual-kinesthetic relationship, as happens with optically modified relationships. The results showed that behavioral compensation in manual centering responses occurred when the normal spatial relationship between visual and kinesthetic input was modified by monocular viewing. That the change in response was not due to a sensory spatial aftereffect or visual muscular effects was indicated by the absence of an effect for the control conditions. It was suggested that the basis for this type of behavioral compensatory change is a changed spatial relationship between vision and proprioceptive input in which new responses persist for a time after normal vision is restored.

A67-81430
CONTRIBUTION OF PULMONARY VAGAL REFLEXES TO CIRCULATORY RESPONSE TO HYPOXIA.
Hermes A. Kontos, David Goldin, David W. Richardson, and John L. Patterson, Jr. (Va. Med. Coll., Dept. of Med., Richmond).
American Journal of Physiology, vol. 212, Jun. 1967, p. 1441–1446. 15 refs.
Grants DA MD 49-193-65-9153; NIH HTS-5573, and NIH FR 000 16-02; Richmond Area Heart Assn. and NIH supported research.

The importance of reflexes from the lungs in the circulatory response to hypoxia was examined in anesthetized dogs. The right lung was denervated by surgical means and infiltration of its hilum with procaine and the left cervical vagus was cut. It was shown that this procedure produced afferent pulmonary vagal denervation, whereas afferent and efferent vagal innervation of the heart were preserved. Before the left vagus was cut, e.g., when the vagal afferents from the left lung were intact, hypoxia produced tachycardia, increase in blood flow through the ascending aorta (electromagnetic flowmeter), and decrease in systemic vascular resistance. After the left vagas was cut, e.g., when pulmonary afferent vagal denervation was complete, these responses to hypoxia were abolished. The results support the view that reflexes from the lungs having their afferent limb in the vagus and elicited by the hyperventilation associated with hypoxia contribute to the tachycardia and increase in cardiac output seen during hypoxia in the anesthetized dogs.

A67-81431
SIGNAL DISCRIMINABILITY, S-R COMPATIBILITY AND CHOICE REACTION TIME.
P. M. Rabbitt (Appl. Psychol. Res. Unit, Cambridge, Great Britain).
Psychonomic Science, vol. 7, Apr. 25, 1967, p. 419–420. 10 refs.

With a very simple display, signal discriminability and stimulus-response (S-R) compatibility interact in their effects on choice reaction time (RT). This result is discussed in the context of previous demonstrations of interactions between a number of different variables affecting choice RT.

A67-81432
RETINAL RIVALRY AND TROXLER'S EFFECT.
Alvin G. Goldstein (Mo. U., Columbia).
Psychonomic Science, vol. 7, Apr. 25, 1967, p. 427–428. 6 refs.

The proposition that Troxler's effect is an interactive process, that is, retinal rivalry between the occluded and non-occluded eye, was tested. It was assumed, that, in one-eyed individuals, binocular interaction was eliminated. Troxler disappearances were measured in monocular subjects and normal subjects. Monocular subjects reported fewer disappearances at each of eight visual meridians. Neither a strong interactive interpretation, nor a strong non-interactive interpretation is supported by these data.

A67-81433
TACTUAL FORM DISCRIMINATION WITH VARYING SIZE AND DURATION OF EXPOSURE.
Harold Lobb and Ronald Friend (Western Ontario U., Canada).
Psychonomic Science, vol. 7, Apr. 25, 1967, p. 415–416. 5 refs.
Ontario Dept. of Health supported research.

Experimental manipulation of the size of random heptagons did not effect tactual discrimination of shape, unless size was varied within subjects. However, duration of exposure was an important condition, which was interpreted as determining the amount of repetition in scanning around vertices during the process of learning angular differences.

A67-81434
RELATIONSHIP BETWEEN THE ELECTROENCEPHALOGRAM, EYE-MOVEMENTS AND FLUCTUATIONS OF VISUAL PERCEPTION.
Barry Kirkwood (Otago U., New Zealand).
Psychonomic Science, vol. 7, Apr. 25, 1967, p. 417–418. 5 refs.

Electroencephalogram (EEG) activity and eye movements were recorded while subjects inspected a Ganzfeld or diffuse dark figures introduced into a Ganzfeld. Reports of deterioration of visual perception under all stimulus conditions were preceded by a period of reduced eye movement, but were not associated with a return of EEG alpha activity.

A67-81435
STIMULUS SIMILARITY IN LEARNING SERIAL VERBAL RESPONSES TO COMPLEX NONVERBAL STIMULI.
Albert F. Healey (Mass. U., Amherst).
Psychological Reports, vol. 20, Apr. 1967, p. 395–401. 8 refs.
NIH supported research.

Serial verbal learning was investigated as a function of stimulus similarity and the number of responses required to each stimulus. The predicted outcome of an inverse relationship between acquisition rate and similarity was obtained and attributed to interference arising from the requirement of relatively distinct responses and interstimulus generalization of those responses. Both rate and, over the number of trials administered, terminal level of performance were lower with two responses than with one response to each stimulus. Implications of obtained data for the theoretical viewpoint were discussed, along with possible extensions of the analysis to other human learning.

A67-81436
IMMEDIATE SERIAL RECALL OF MIXED LETTER STRINGS.
M. S. Mayzner and M. E. Tresselt (N. Y. U., New York City).
Psychonomic Science, vol. 7, Apr. 25, 1967, p. 401–402. 5 refs.
Contract Nonr 285(56).

This study examined the immediate serial recall of letter strings composed of a mix of high and low frequency consonants, for high and low digram storage subjects. The results clearly showed that high digram storage subjects show superior recall to low digram storage subjects for mixed letter strings and that systematic proactive and retroactive effects on recall performance occur with such mixed letter strings.

A67-81437
CALIBRATION OF LIMED FILTER PAPER FOR MEASURING SHORT-TERM HYDROGEN FLUORIDE DOSAGES: THE EFFECT OF TEMPERATURE, HUMIDITY, WIND SPEED, AND DOSE.
W. L. Wilson, M. W. Campbell, L. D. Eddy, and W. H. Poppe (Boeing Co., Aerospace Group, Seattle, Wash.).
American Industrial Hygiene Association Journal, vol. 28, May–Jun. 1967, p. 254–259. 5 refs.

Limed filter papers were exposed to analyzed concentrations of hydrogen fluoride under controlled conditions of temperature, dew point, concentration, windspeed, and time. The exposed papers were analyzed for their fluoride content. Within the limits of accuracy of the test setup, the following conclusions are made: Temperature, dew point, concentration, and time have little or no effect on absorption. Dose has little or no affect on absorption until dosages in excess of 400 to 600 p.p.m. min., dependent on wind-speed, are reached. Within the limits of 3 to 18 m.p.h., absorption varies with dosage according to the following equation: $\mu g/dm^2$/p.p.m. min. = 1.07 × windspeed (m.p.h.) + 11.

A67-81438
EFFECT OF STRENUOUS AND GRADED EXERCISE ON FIBRINOLYTIC ACTIVITY.
I. Sudhakaran Menon, F. Burke, and H. A. Dewar (Newcastle upon Tyne U., and Roy. Victoria Infirmary, Dept. of Med., Great Britain).
Lancet, vol. 1, Apr. 1, 1967, p. 700–702. 23 refs.

Increased fibrinolytic activity after strenuous exercise was observed in 58 trained athletes and to a lesser but still significant degree in ten volunteers after moderate graded exercise. The maximum increase in fibrinolytic activity in the untrained volunteers was reached within 1 1/2 min. of their exercise and no greater effect was achieved by prolonged exercise. The increase in activity was, however, found to persist for at least one hr. after the exercise. To obtain the beneficial effects of exercise and prevent thromboembolism it is not necessary to involve the actual endangered part of the body; exercise of the arms, for instance, will benefit a leg encased in plaster.

A67-81439
EFFECTS OF BREATHING 100 PER CENT OXYGEN GROUND LEVEL ON BLOOD CLOTTING TIME AND PLATELET COUNT.
C. S. Nair (A.F. School of Aviation Med., Hindustan Aircraft P.O. Bangalore-17, India).
Indian Journal of Medical Research, vol. 55, Feb. 1967, p. 123–127. 11 refs.

Blood clotting time and platelet count were determined on normal healthy individuals of ages 20 to 30, exposed to 100% oxygen at ground level. Results showed shortening of blood coagulation time and reduction of blood platelet count. No such changes were observed in control subjects who were

fitted with mask and helmet but breathed atmospheric air. Clotting time and platelet count returned to normal within a short time after oxygen breathing was discontinued. Changes in the pH of the blood due to disturbance of the CO_2 content may be the cause of the shortened coagulation time. Pulmonary capillary damage may be responsible for the increased destruction of platelets.

A67-81440
THE SEAT BELT SYNDROME: SIGMOID COLON PERFORATION.
Robert M. Blumenberg (U.S. Army Hosp., Dept. of Surg., Ryukyu Islands, Japan).
Annals of Surgery, vol. 165, Apr. 1967, p. 637–639. 7 refs.

Intra-abdominal and pelvic visceral and mesenteric injuries incurred while wearing a seat belt have been reviewed. A case of perforation of the sigmoid colon following seat belt injury is reported. The mechanisms of intra-abdominal injury resulting from seat belts are discussed in general, and specifically in relation to the case presented.

A67-81441
POTASSIUM DEPLETION IN PERMANENT INHABITANTS OF HOT AREAS.
M. Toor, J. Agmon, I. Zahavi, M. Wurzel, and J. B. Rosenfeld (Beilinson Hosp., Third Med. Dept. and Cardiopulmonary Lab., Histadrut Inst. of Occupational Health and Environ. Physiol., Petah Tikva, Israel).
Israel Journal of Medical Sciences, vol. 3, Jan.–Feb. 1967, p. 149–151. 5 refs.

Ten, young, healthy workers permanently living in a hot region were studied during and after one wk. of daily loads of eight g. KC1. Maximal urinary concentration tests were performed after one wk. of potassium loading and again after one mo. After one wk. of potassium load there was an increase in the concentration ability of the kidney, and a decrease after one mo. It is conceivable that a subclinical potassium depletion may develop during the long summer months. The results support the assumption that renal concentration ability changes were caused by mild potassium depletion. Potassium depletion may play a part in the etiology and pathogenesis of certain cases of heart failure.

A67-81442
ON THE PHYSIOLOGICAL MECHANISM OF TEMPERATURE HOMEOSTASIS CHANGES AT LOWERED OXYGEN PARTIAL PRESSURE IN INSPIRED AIR [O FIZIOLOGICHESKIKH MEKHANIZMAKH IZMENENII TEMPERATURNOGO GOMEOSTAZISA PRI PONIZHENNOM PARTSIAL'NOM DAVLENII KISLORODA VO VDYKHAEMOM VOZDUKHE].
Iu. S. Aliukhin, L. P. Dymnikova, and K. P. Ivanov (USSR, Acad. of Sci., I. P. Pavlov Inst. of Physiol., Leningrad).
Fiziologicheskii Zhurnal SSR, vol. 53, Feb. 1967, p. 178–183. 18 refs. In Russian.

Lowering of body temperature in white rats concurrent with a decrease in oxygen partial pressure in the air correlates with a diminution in quantitative indices of muscular activity (at room temperature). When the oxygen partial pressure is normalized, one notices a very distinct correlation between the increased muscular activity and a rise in body temperature. The specific depression effect of lowered oxygen partial pressure in the air on thermoregulative functions is weakened along with the development of hypothermia. One is lead to suppose that in hypothermia the tissue oxygen tension rises. Along with a fall of the critical oxygen tension this fact may increase the resistance of physiological functions to hypoxemia in the cooled body.

A67-81443
OXYGEN TENSION IN THE BLOOD OF DOGS WITH RAISED INTRAPULMONARY PRESSURE [NAPRIAZHENIE O_2 V KROVI SOBAK PRI POVYSHENNOM VNUTRILEGOCHNOM DAVLENII].
I. N. Cherniakov.
Fiziologicheskii Zhurnal SSSR, vol. 53, Mar. 1967, p. 324–329. 24 refs. In Russian.

Absolute values of pO_2 were determined by polarigraphic method in arterial and venous blood of dogs breathing air or oxygen under excessive pressure. At 30 mm. Hg intrapulmonary pressure oxygen was found to induce a peculiar hypoxic state manifested by considerable reduction of venous blood pO_2 (from 55 to 39.5 mm. Hg) and a sharp rise of pO_2 in arterial blood (from 91 to 491 mm. Hg). Oxygen, and particularly air, respiration under excessive pressure resulted in reduction of the alveolar-arterial pO_2 gradient, probably due to closure of pulmonary arteriovenous anastomoses. Under normal pressure, the response to oxygen respiration was reversed–opening of arterio-venous anastomoses, as shown by the alveolar-arterial pO_2 gradient rising from an initial value of 23 mm. Hg to 209 mm. Hg. Administration of hexenal resulted in a two- to three-fold increase of pO_2 in venous blood draining the brain, due to reduced uptake of oxygen by the brain under anesthesia.

A67-81444
EFFECT OF PHYSICAL EFFORT ON THE LEVEL OF COMPLETE AND UNESTRIFIED CHOLESTEROL IN BLOOD SERUM IN TRAINED AND UNTRAINED STUDENTS [WPLYW WYSILKU FIZYCZNEGO NA POZIOM CHOLESTEROLU CALKOWITEGO I NIEZESTRYFIKOWANEGO W SUROWICY KRWI STUDENTOW].
S. Rotenberg and T. Mieczkowski.
Wychowanie Fizyczne i Sport, vol. 10, no. 4, 1966, p. 9–14. 7 refs. In Polish.

The level of complete and unestrified cholesterol in the blood serum of students was determined before physical exercise, at the end of it and after a 45-min. rest. Increase in the level of complete and estrified cholesterol in blood serum was observed after the exercise. It was statistically significant in the trained and more efficient students. The complete cholesterol content in the blood serum of trained students dropped below the initial level after rest. In the untrained group, the level of complete cholesterol increased after the 45-min. rest. No marked, statistically significant changes in the content of unestrified cholesterol in blood serum was noted in any of the groups investigated in connection with physical effort. The changes in the complete and estrified cholesterol content in blood caused by physical exercise in trained students indicate a faster mobilization of fatty acids and their better utilization during physical effort.

A67-81445
LIPID AND FATTY ACID COMPOSITION OF GASTRIC JUICE IN MAN ON FASTING AND ON STIMULATION BY MEANS OF AN ALCOHOLIC DRINK [COMPOSIZIONE LIPIDICA ED IN ACIDI GRASSI DEL SUCCO GASTRICO UMANO A DIGIUNO E DOPO STIMOLAZIONE CON BEVANDA ALCOLICA].
Domenico Lombardi, Salvatore Condorelli, and Luigi Pisano (Rome U., Ist. di Clin. Med. Gen. e Terapi Med. and Ist. di Semeiotica Chir., Italy).
La Ricerca Scientifica, vol. 36, Oct. 1966, p. 1052–1062. 14 refs. In Italian.

By means of a gastric sound, maintained throughout the experiment, the gastric contents of 17 subjects between 26–64 years of age were obtained after 8 hr. of fasting, and 30, 60, and 90 min. after the administration of an alcoholic drink (200 ml. of a 10% ethanol solution). The results indicate that the glands of human gastric mucosa possess a lipidosecretory function similar to other digestive glands (intestinal, salivary). Lipids secreted from the gastric mucosa consisted primarily of: phospholipids, free cholesterol, free fatty acids, triglycerides, and cholesterol esters; phospholipid fractions included lecithin, cephalin, sphingomyeline, and lysolecithin. The percentual composition of fatty acids in total lipid contained in gastric juice taken after an 8 hr. fast, after mechanical stimulation with sound, and at various times after alcoholic stimulation was fundamentally similar. Total fatty acid concentration taken from gastric juice in subjects fasting for 8 hr. was notably greater than that taken 30 min. after introduction of the sound, and also from that taken following alcoholic stimulation. The lipid and fatty acid composition of gastric juice differed from that of the gastric mucosa epithelium, and from that of saliva and blood serum.

A67-81446

CONTINUOUS SYNCHRONOUS CULTURE OF PHOTOSYNTHETIC MICRO-ORGANISMS.

John A. Howell, H. M. Tsuchiya, and A. G. Fredrickson (Minn. U., Dept. of Chem. Eng., Minneapolis).

Nature, vol. 215, May 6, 1967, p. 582–584. 8 refs.

NASA supported research.

Previous work on synchronized cultures of the green alga, *Chlorella*, by the imposition of ordered light patterns was briefly discussed. For the present experiment a continuous, steady-state apparatus was devised. The cells were, on the average, in different stages of their life cycle in separate vessels. A series of stirred tanks, some illuminated and some in the dark, were used to provide synchronous cultures. The largest overall cell size was found in the illuminated tanks. The principle of the apparatus also applies to the propogation of organisms other than algae, for example bacterial cultures. Also, the series arrangement could conceivably be used to provide a continuous source of bacterial spores and microbial products such as bacitracin.

A67-81447

RAT ADRENAL CORTICAL ACTIVITY DURING EXPOSURE TO A HIGH (34°C) AMBIENT TEMPERATURE.

Sayed Kotby and Harold D. Johnson (Mo. U., Columbia).

Life Sciences, vol. 6, Jun. 1, 1967, p. 1121–1132. 15 refs.

Grant DEEFPR EF-00229.

A highly significant ($P < .01$) elevation of plasma corticosterone concentration was observed in rats exposed to heat (34°C.) for periods ranging from 6 hr. to 12 days. The highest level of plasma glucocorticoid (corticosterone) was attained at the end of the first day of exposure. At all exposure times with the exception of the animal groups at 30 hr. and 13 days, the values were significantly higher than the 28°C. average control values. These data suggested the occurrence of a transient rise in adrenocortical activity at 24 hr., followed by an under-compensation at 30 and 48 hr. with some continued elevation of activity for most of the remainder of this exposure period. The increase in plasma corticosterone, a calorigenic hormone, may serve as a precursor for increased aldosterone production during acclimation to heat.

A67-81448

EFFECT OF HIGH OXYGEN TENSIONS ON DIFFUSING CAPACITY FOR CO AND KROGH'S K.

Edith Rosenberg and Lloyd D. MacLean (McGill U., Dept. of Exptl. Surg. and Roy. Victoria Hosp., Montreal, Canada).

Journal of Applied Physiology, vol. 23, Jul. 1967, p. 11–17. 31 refs.

MRC, Canada and PHS supported research.

Resting single-breath diffusing capacity for carbon monoxide (the product of Krogh's K and alveolar volume, (V_A) was measured in eight healthy young men breathing air after breathing oxygen at 1 atm. and after breathing O_2 at 3 atm. (OHP) for varying time periods. No decrease in diffusion for CO (D_L) was seen after any exposure to oxygen. Breathing 99% O_2 at 1 atm. for 3 hr. affected neither K nor V_A measured at normal P_{O_2}, but breathing 99% O_2 at 3 atm. increased K measured at normal P_{O_2} in six of the seven subjects exposed to 3 atm. In two of the subjects the increase occurred after 1 hr. or less of exposure and K returned to resting values after 2 hr. of exposure. V_A was not affected in six of the subjects studied at 3 atm. but was decreased after 2 hr. exposures in the seventh. These observations suggest that the primary response of the normal human pulmonary system to hyperbaric oxygen is an increase in the size of the pulmonary capillary bed (K).

A67-81449

EFFECT OF HIBERNATION ON OXYGEN CONSUMPTION AND THYROIDAL I^{131} RELEASE RATE OF *MESOCRICETUS AURATUS*.

M. K. Yousef, D. Robertson, and H. D. Johnson (Mo. U., Dairy Husbandry Dept., Columbia).

Life Sciences, vol. 6, Jun. 1, 1967, p. 1185–1194. 10 refs.

Mo. U. supported research.

A continuous recording of O_2 consumption, CO_2 production and respiration quotient (RQ) of the golden hamster during the hibernation cycle was presented. The O_2 consumption decreased from a value of 2,679 to a value of 71 ml./kg./hr. The CO_2 production decreased from a value of 2,295 to a value of 43 ml./kg./hr. The low RQ during deep hibernation indicates that fat is being utilized. The O_2 consumption fell sharply to a minimum value within four to six hr. from the start of its decline and the animals were in deep hibernation within six to eight hr. of the start of the hibernation process. Arousal from hibernation was characterized by a sharp increase in O_2 consumption, CO_2 production and RQ reached a a maximum in approximately one hr. After the sharp increase the values declined to near normal within 90 min. Thyroidal I^{131} release rate was decreased from a K value of 13.8 to a value of 5.03 during deep hibernation. These results on the energy utilization of the hibernating hamster indicate that during hibernation heat production is regulated at a markedly reduced level.

A67-81450

MODIFICATION OF TOLERANCE TO POTASSIUM AND URINARY EXCRETION OF ELECTROLYTES IN RATS RAISED IN A WARM CLIMATE [MODIFICATION DE LA TOLERANCE AU POTASSIUM ET DE L'EXCRETION URINAIRE DES ELECTROLYTES CHEZ LE RAT ELEVE EN CLIMAT CHAUD].

J. G. Henrotte and Z. M. Bacq (Liege U., Lab. of Pathol. and Gen. Therap., Belgium).

Life Sciences, vol. 6, Jun. 1967, p. 1201–1205. In French.

It was found that a prolonged exposure (25 wk.) of rats to a warm, humid climate resulted in: (1) decreases in the tolerance for K in the rat just as in man; (2) decreases in the Na/K ratio in the urine; and (3) decreases in the weight of the suprarenals. These facts suggest that prolonged exposure to tropical climates decreases the activity of the adrenal cortex.

A67-81451
SEASONAL OBSERVATIONS ON THE CARDIAC RHYTHM DURING DIVING IN THE KOREAN AMA.
S. K. Hong, S. H. Song, P. K. Kim, and C. S. Suh (Yonsei U., Coll. of Med., Depts. of Physiol., Seoul, Korea and N. Y. U., Buffalo).
Journal of Applied Physiology, vol. 23, Jul. 1967, p. 18–22. 21 refs.
Grant NSF G-24044.

Electrocardiograms were obtained from five ama in the summer (water temperature of 27°C.) and the winter (water temperature of 10°C.) during each of the following apneic maneuvers: (1) breath holding (BH) in air, (2) BH in water, (3) surface swim with head submerged underwater, and (4) diving to a depth of 5 m. Although a sinus bradycardia was noted in all cases, the extent of this bradycardia was least during BH in air and was greatest during BH in water as well as during surface swim. Moreover, the bradycardia during diving was less severe than during BH in water. Quantitatively, the extent of bradycardia during each apneic maneuver was approximately 20% greater in the winter than in the summer. Cardiac arrhythmias were uniformly noted in all apneic maneuvers, the incidence being approximately 43% in the summer and 72% in the winter. Of various arrhythmias, abnormal P wave and nodal rhythm were most frequently observed, although idioventricular rhythm, premature atrial beats, and premature ventricular beats were occasionally seen. On the basis of these findings, it is concluded that the diving bradycardia is mainly attributable to both breath holding and water submergence and the cardiac arrhythmia during diving to breath holding alone, and also that cold stimulus plays a valuable role in potentiating the development of both bradycardia and arrhythmia during diving.

A67-81452
EFFECTS OF TRAINING AT MODERATE ALTITUDE ON PHYSICAL PERFORMANCE CAPACITY.
John A. Faulkner, Jack T. Daniels, and Bruno Balke (Mich. U., Dept. of Phys. Educ., Ann Arbor and Wis. U., Depts of Physiol. and Phys. Educ., Madison).
Journal of Applied Physiology, vol. 23, Jul. 1967, p. 85–89. 10 refs.

Five well-conditioned men and sixteen highly conditioned college swimmers trained daily at an elevation of 200 m. (sea level) before and after a period of training at an altitude of 2,300 m. The maximum oxygen uptake was significantly lower at altitude and the pulmonary ventilation (BTPS) significantly higher. After three weeks of training at altitude, the five men approximated sea-level control values of maximum oxygen uptake on a bicycle ergometer test. The college swimmers did not regain sea-level control values of maximum oxygen uptake during tethered swimming at altitude. The same maximum values were attained in heart rate and systolic blood pressure at both elevations. In both groups, hemoglobin and hematocrit ratio values increased significantly during training at altitude but returned to normal on return to sea level. In events of over 2-min. duration initial performances at 2,300 m. were impaired 5-6% compared to control values obtained at sea level. On return to sea level, maximum oxygen uptakes and time trial performances of the five well-conditioned men were improved compared to prealtitude control values. No significant changes were observed in the group of highly conditioned swimmers.

A67-81453
OXYGEN DELIVERY RATE OF HUMAN BLOOD.
J. Percy Baumberger, Helen Chinn Leong, and J. Ryan Neville (Palo Alto Med. Res. Found., Calif.).
Journal of Applied Physiology, vol. 23, Jul. 1967, p. 40–46. 18 refs.
Contracts AF 41(609)-1695 and AF 41(657)-255.

A special characteristic of blood, its oxygen delivery rate (ODR), is discussed in detail and polarographic methods for its study are presented. Experimental results show (a) an increase in ODR with decrease in percent saturation of hemoglobin and (b) a significant difference in the ODR of the blood of one individual as compared to that of another. The significance of ODR to tissue hypoxia and the general relationship of ODR to other aspects of the oxygen transport system are discussed. While no definite explanation has been found for the observed individual differences in ODR, variations in the erythrocytes themselves would appear likely to be a decisive factor.

A67-81454
BLOOD-BRAIN TISSUE PCO_2 RELATIONSHIPS AND VENTILATION DURING REBREATHING.
D. J. C. Read and J. Leigh (Sydney U., Dept. of Med. and Roy. Prince Alfred Hosp., Page Chest Pavilion, Sydney, Australia).
Journal of Applied Physiology, vol. 23, Jul. 1967, p. 53–70. 38 refs.

Equations describing nonsteady CO_2 exchange of medullary chemoreceptor tissue, for variable local blood flow, were solved using an analogue computer to predict the relations between: brain tissue P_{CO_2} (PR) and arterial P_{CO_2} (Pa); brain tissue-arterial P_{CO_2} difference (PR–Pa) and time of rebreathing (t); ventilation (V_E) and arterial P_{CO_2}. Theory predicted, after 20 sec. of rebreathing 7% CO_2 from a small bag; a markedly reduced and relatively constant PR–PA; near linearity of PR/PA and V_E/Pa curves; insensitivity of PR/Pa and V_E/Pa curves to alteration of receptor blood flow; V_E/Pa curves which were displaced to the right of those for rebreathing 7% CO_2 from a large bag, those for rebreathing without CO_2 from a large bag, those for rebreathing without CO_2 in the bag, and those for steady-state CO_2 inhalation. Experimentally determined V_E/Pa curves confirmed these predictions. These predictions and data are examined in relation to *in vivo* CO_2 dissociation curves of arterial blood and brain tissue, transient fluxes of bicarbonate ions between brain interstitial fluid and cerebrospinal fluids, and peripheral chemoreceptor drive.

A67-81455
DIFFERENTIAL EFFECTS OF CHRONIC ACCELERATION ON SKELETAL MUSCLES.
R. R. Burton, E. L. Besch, S. J. Sluka, and A. H. Smith (Calif., U., Dept. of Animal Physiol., Davis).
Journal of Applied Physiology, vol. 23, Jul. 1967, p. 80–84. 25 refs.
NASA Grant NGR-05-004-008.

Single-combed white Leghorn male chickens were exposed to an increased accelerative force for several months. The birds were sacrificed and a hip extensor (m. adductor) and a hip flexor (m. sartorius) were removed and weighed. Glycogen and fat determinations were also made on the same muscles. Increased chronic acceleration generally causes an increase in the extensor muscle mass and a reduction in the flexor muscle mass. Muscle glycogen concentrations were not affected, however the muscle fat was reduced by the treatment and, to a greater extent, in the extensors. One year habitation at 2 g (weight:mass ratio) was of sufficient duration to produce 85% of the potential muscle mass changes. At normal gravity, 29% of the flexor muscle and 48% of the extensor muscle are apparently dependent upon the weight of the bird; i.e., the effect of gravity.

Subject Index

AEROSPACE MEDICINE AND BIOLOGY / *a continuing bibliography* SEPTEMBER 1967

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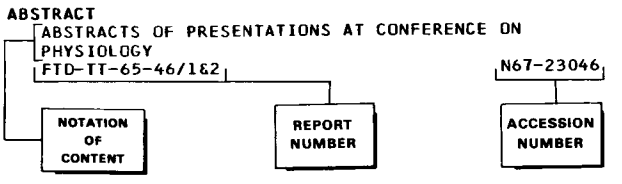

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Typical Corporate Source Index Listing

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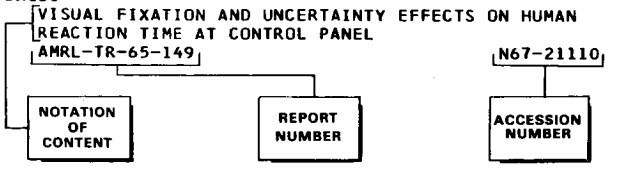
VISUAL FIXATION AND UNCERTAINTY EFFECTS ON HUMAN REACTION TIME AT CONTROL PANEL
AMRL-TR-65-149 N67-21110



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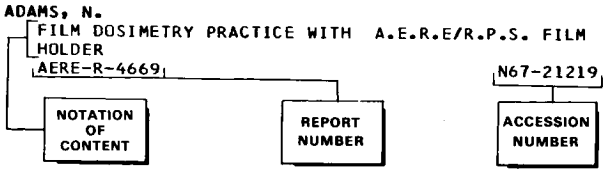

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